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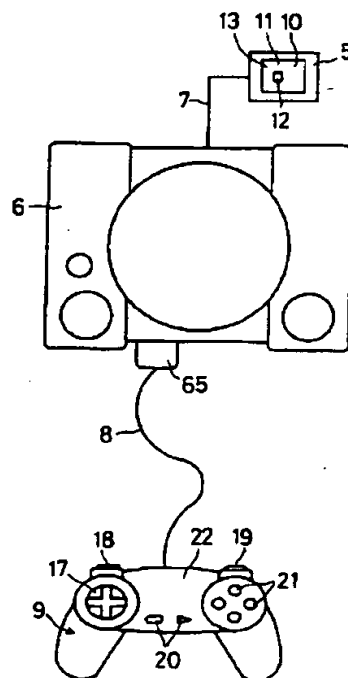
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(54) 【考案の名称】 家庭用ビデオゲーム機用入力操作装置

(57) 【要約】

【課題】 ゲームの画面におけるキャラクタまたは背景の表示態様の円滑な変化を可能にするとともに、ゲーム機本体に内蔵されたマイクロコンピュータの情報処理の負担を軽減すること。

【解決手段】 全方向指示可能なアナログ式第1入力手段と、アナログ式第2入力手段と、デジタル式押ボタンなどである第3入力手段とを備え、これらの第1～第3入力操作手段の出力を入力操作装置に内蔵してある処理手段に与える。処理手段では、ゲーム機本体からの指示信号に応答して、必要な種類の演算処理を行うために、第1および第2検出信号をデジタル値に変換してレベル弁別し、予め定める複数の各範囲のうちで属する前記範囲を判断し、その判断された前記範囲に対応したデータ信号を、シリアルデータ列でゲーム機本体に導出する。第1および第2入力操作手段は、導電性感圧ゴムを用いる。



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【実用新案登録請求の範囲】

【請求項1】 キャラクタまたは背景の表示態様を変化する家庭用ビデオゲーム機用入力操作装置であって、この入力操作装置は、第1、第2および第3の入力操作手段を有し、

第1の入力操作手段は、操作の位置の全方向を指示するための第1加圧手段を有し、その第1加圧手段による押圧力によって電気的特性が変化するアナログ式の複数の第1検出装置から成り、その第1検出装置から検出された第1検出信号を導出し、

第2の入力操作手段は、直線状の方向を指示する第2加圧手段を有し、その第2加圧手段による押圧力によって電気的特性が変化するアナログ式の第2検出装置から成り、その第2検出装置から検出された第2検出信号を導出し、

第3の入力操作手段は、非操作状態と操作状態とを検出する第3検出装置から成り、その第3検出装置は2値のレベルを導出し、

本件家庭用ビデオゲーム機用入力操作装置は、さらに、第1、第2および第3の検出信号をインタフェースを介して取得し、キャラクタまたは背景を操作するための一連の動作情報を表すデータ信号を生成する検出信号処理手段と、

ゲーム機本体にデータ信号を導出する通信手段とを有することを特徴とする家庭用ビデオゲーム機用入力操作装置。

【請求項2】 処理手段は、ゲーム機本体から与えられる必要な種類の演算処理を表す指示信号に応答し、その指示信号が表す演算処理を行うことを特徴とする請求項1記載の家庭用ビデオゲーム機用入力操作装置。

【請求項3】 3次元演算手法によりゲーム内キャラクタ等を生成する家庭用ビデオゲーム機用入力操作装置において、

操作の位置の全方向を指示することができるアナログ式の第1検出信号を発生する第1操作手段と、

アナログ式の第2検出信号を発生する第2操作手段と、

デジタル式の第3検出信号を発生する第3操作手段と、

複数の演算処理手段を有する処理手段であって、ゲーム機本体が所望する演算処理手段を判断し、第1および第2検出信号をアナログ/デジタル変換した値を、演算処理手段により予め設定された複数のしきい値に対してどの範囲に属するか1回もしくは複数回判断し、その範囲に対応した前記演算処理手段による処理を行わせるべく、ゲーム機本体のフォーマットに適合したデータ信号のデータ列を生成し、ゲーム機本体へ導出する処理手段とを含むことを特徴とする家庭用ビデオゲーム機用入力操作装置。

【請求項4】 画面に、キャラクタまたは背景の表面を多数の領域に分けて各領域に選択的に陰影を付けて立体的に表示し、または視点位置を変えて立体的に表示する

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3次元演算手法を用い、かつキャラクタまたは背景の表示態様を変化する家庭用ビデオゲーム機用入力操作装置において、

操作の位置の全方向を指示するとともに、アナログ式の第1検出信号を発生する第1入力操作手段と、

アナログ式の第2検出信号を発生する第2入力操作手段と、

操作されることによって一方レベルを有し、かつ操作されないことによって他方レベルを有するデジタル式の第3検出信号を発生する第3入力操作手段と、

ゲーム機本体からの必要な種類の演算処理を表す指示信号に応答し、第1および第2検出信号をアナログ/デジタル変換し、そのアナログ/デジタル変換された信号またはそのアナログ/デジタル変換された信号を指示信号に対応して演算処理した信号が、予め定める複数の各範囲のうちで属する前記範囲をレベル弁別して判断し、その判断された前記範囲に対応して演算処理されたデータ信号を、ゲーム機本体との通信フォーマットに適合したデータ列で作成して、ゲーム機本体に導出する処理手段とを含むことを特徴とする家庭用ビデオゲーム機用入力操作装置。

【請求項5】 第1または第2検出信号は、操作される押圧力に対応したレベルを有することを特徴とする請求項3または4記載の家庭用ビデオゲーム機用入力操作装置。

【請求項6】 第1または第2入力操作手段は、剛性の電気絶縁性配線基板と、

配線基板上に相互に隣接して配置される一対の電極と、前記一対の電極にわたって配置され、操作者の手による押圧力によって電極間の電気抵抗が変化する弾発力を有する感圧部材とを含むことを特徴とする請求項1または5記載の家庭用ビデオゲーム機用入力操作装置。

【請求項7】 前記一対の電極は、複数の各組を成して設けられ、

感圧部材は、単一枚であって、全ての組の電極にわたって配置され、

複数の組の電極は、感圧部材を介して直列回路を形成して接続され、

少なくとも1つの組の電極付近の上方で感圧部材上に操作による押圧力が与えられ、

各組の電極間からの分圧電圧を第1または第2検出信号として導出することを特徴とする請求項6記載の家庭用ビデオゲーム機用入力操作装置。

【請求項8】 第1入力操作手段は、剛性の電気絶縁性配線基板と、

この配線基板上に3以上の複数の各組を成して形成される電極であって、各組の電極は、相互に隣接して対を成して配置され、各組の電極は仮想上の閉ループ上に配置される電極と、

単一枚であって、全ての組の電極にわたって配置され、

操作の位置の全方向を指示するとともに、アナログ式の第1検出信号を発生する第1入力操作手段と、

アナログ式の第2検出信号を発生する第2入力操作手段と、

デジタル式の第3検出信号を発生する第3入力操作手段と、

ゲーム機本体からの必要な種類の演算処理を表す指示信号に応答し、第1および第2検出信号をアナログ/デジタル変換し、そのアナログ/デジタル変換された信号またはそのアナログ/デジタル変換された信号を指示信号に対応して演算処理した信号が、予め定める複数の各範囲のうちで属する前記範囲をレベル弁別して判断し、その判断された前記範囲に対応して演算処理されたデータ信号を、ゲーム機本体との通信フォーマットに適合したデータ列で作成して、ゲーム機本体に導出する処理手段とを含むことを特徴とする家庭用ビデオゲーム機用入力操作装置。

【請求項9】 第1または第2検出信号は、操作される押圧力に対応したレベルを有することを特徴とする請求項3または4記載の家庭用ビデオゲーム機用入力操作装置。

【請求項10】 第1または第2入力操作手段は、剛性の電気絶縁性配線基板と、

配線基板上に相互に隣接して配置される一対の電極と、前記一対の電極にわたって配置され、操作者の手による押圧力によって電極間の電気抵抗が変化する弾発力を有する感圧部材とを含むことを特徴とする請求項1または5記載の家庭用ビデオゲーム機用入力操作装置。

【請求項11】 前記一対の電極は、複数の各組を成して設けられ、

感圧部材は、単一枚であって、全ての組の電極にわたって配置され、

複数の組の電極は、感圧部材を介して直列回路を形成して接続され、

少なくとも1つの組の電極付近の上方で感圧部材上に操作による押圧力が与えられ、

各組の電極間からの分圧電圧を第1または第2検出信号として導出することを特徴とする請求項6記載の家庭用ビデオゲーム機用入力操作装置。

押圧力によって各組の対を成す電極間の電気抵抗が変化する弾発力を有する導電性の感圧部材とを含み、複数の組の電極は、感圧部材を介して直列回路を形成して接続され、

各組の電極間からの分圧電圧を前記第1検出信号として導出することを特徴とする請求項1、3または4記載の家庭用ビデオゲーム機用入力操作装置。

【請求項9】 感圧部材の厚み方向の電極とは反対側に、剛性の材料から成る操作部材が設けられ、この操作部材には、操作部材によって感圧部材が予め圧縮されるように感圧部材の弾発力に抗する変位を制限する変位制限手段が設けられ、感圧部材が予め圧縮されることによって、操作部材の押圧力の変化量に対応して検出信号のレベルの急激な変化量が生じる範囲外で、操作部材が押圧操作されることを特徴とする請求項6、7または8記載の家庭用ビデオゲーム機用入力操作装置。

【請求項10】 前記仮想上の閉ループは、点対称の形状を有し、電極の対を成す各組は、点対称に配置されて4以上の偶数組、設けられ、剛性の材料から成る操作部材をさらに含み、この操作部材は、感圧部材の厚み方向の電極とは反対側の表面に配置される周辺部を有し、揺動自在に支持され、点対称の位置にある2組の電極が、感圧部材を介して直列回路を形成して接続されることを特徴とする請求項8記載の家庭用ビデオゲーム機用入力操作装置。

【請求項11】 感圧部材は、中央の孔を有し、前記仮想上の閉ループに沿う環状であり、操作部材は、前記中央の孔を挿通して配線基板上に支持される支持突起を有し、操作部材の前記周辺部の感圧部材側の表面は、操作部材の軸線から遠去かるにつれてその軸線方向に前記支持突起から遠去かるように傾斜した押圧面を有し、前記押圧面と感圧部材との間に、弾発力を有する緩衝材が介在されていることを特徴とする請求項8または10記載の家庭用ビデオゲーム機用入力操作装置。

【請求項12】 緩衝材は、閉ループの周方向に分断されて各組の直上に配設されていることを特徴とする請求項11記載の家庭用ビデオゲーム機用入力操作装置。

【請求項13】 操作部材には、操作部材によって感圧部材が予め圧縮されるように感圧部材の弾発力に抗する変位を制限する変位制限手段が設けられ、感圧部材が予め圧縮されることによって、操作部材の押圧力の変化量に対応して検出信号のレベルの急激な変化量が生じる範囲外で、操作部材が押圧操作されることを特徴とする請求項10、11または12記載の家庭用ビデオゲーム機用入力操作装置。

【請求項14】 処理手段は、第1または第2検出信号

のレベルが、操作物理量の1次関数の値となるデジタル値に変換し、このデジタル値をレベル弁別して判断することを特徴とする請求項1～13のうちの1つに記載の家庭用ビデオゲーム機用入力操作装置。

【請求項15】 処理手段は、第1または第2検出信号の前記アナログ/デジタル変換された値の変化によって、操作された速度を求めて、その変化の速度をレベル弁別して判断することを特徴とする請求項1～14のうちの1つに記載の家庭用ビデオゲーム機用入力操作装置。

【請求項16】 処理手段は、第1または第2検出信号の前記アナログ/デジタル変換された信号を、第1弁別レベルV1以上になってから予め定める第1の時間W1経過後に、第1弁別レベルV1を超える第2弁別レベルV2でレベル弁別することを特徴とする請求項15記載の家庭用ビデオゲーム機用入力操作装置。

【請求項17】 処理手段は、第1または第2検出信号の前記アナログ/デジタル変換された信号を、第3弁別レベルV2以下になってから予め定める第2の時間W2経過後に、第3弁別レベルV2未満である第4弁別レベルV3でレベル弁別することを特徴とする請求項15記載の家庭用ビデオゲーム機用入力操作装置。

【請求項18】 処理手段は、第1または第2検出信号の前記アナログ/デジタル変換された信号を、1または複数の相互に異なる弁別レベルでレベル弁別することを特徴とする請求項1～14のうちの1つに記載の家庭用ビデオゲーム機用入力操作装置。

【請求項19】 処理手段は、第1および第2検出信号の前記判断された範囲ならびに第3検出信号の相関に対応して、データ信号を作成することを特徴とする請求項1～14のうちの1つに記載の家庭用ビデオゲーム機用入力操作装置。

【請求項20】 処理手段は、第1または第2検出信号の前記アナログ/デジタル変換された信号を、複数の相互に異なる弁別レベルでレベル弁別して前記範囲を判断し、前記判断された範囲に対応して、時間経過に伴って論理値が変化する時系列的なデータ信号を導出することを特徴とする請求項1～14のうちの1つに記載の家庭用ビデオゲーム機用入力操作装置。

【請求項21】 処理手段は、画面の各フレームに同期して、予め定める複数のフレーム数を単位として、それらの複数のフレームのうちの前記判断された範囲に対応した1または複数のフレームでは一方の論理値であり、残余のフレームでは他方の論理値であるデータ信号を時系列的に導出することを特徴とする請求項20記載の家庭用ビデオゲーム機用入力操作装置。

【請求項22】 前記配線基板上に設けられ、一対の電

極のうちの一方の電極に直列に接続されて、前記一对の電極間の感圧部材とともに直列回路を形成して分圧電圧を第1または第2検出信号として得る固定抵抗をさらに含むことを特徴とする請求項6記載の家庭用ビデオゲーム機用入力操作装置。

【図面の簡単な説明】

【図1】本考案の実施の一形態の全体の構成を簡略化して示す平面図である。

【図2】家庭用ビデオゲーム機の全体の構成を簡略化して示すブロック図である。

【図3】第1入力操作手段17の縦断面図である。

【図4】第1入力操作手段17の簡略化した平面図である。

【図5】図3の切断面線V-Vから見た断面図である。

【図6】本考案の実施の他の形態の第1入力操作手段17の簡略化した断面図である。

【図7】配線基板26上に形成された各組27～30の電極27a、27b；28a、28b；…を示す平面図である。

【図8】電極の各組27～30の接続状態を示す電気回路図である。

【図9】右キー47と左キー48とに関連する図8に示される電気回路の一部を書直した電気回路図である。

【図10】1つの組27における感圧部材32による電極27a、27b間の電気抵抗を、操作部材35による押圧力に対応した特性を示すグラフである。

【図11】感圧部材32の押圧力に依存した電気抵抗を表す第1検出信号のアナログ/デジタル変換されたデジタル値を表すライン61の特性を、その押圧力の1次関数の値となるデジタル値の特性を示すライン62に変換して補正するための動作を説明するためのグラフである。

【図12】処理手段16における中央処理回路24の動作を説明するためのフローチャートである。

【図13】入力操作装置9の操作による表示手段10における画面11の表示態様を説明するための図である。

【図14】画面11内におけるキャラクタ12の右方向への移動を説明するための図である。

【図15】入力操作装置9における処理手段16の動作を説明するための波形図である。

【図16】画面11におけるキャラクタ12を軌跡71、72をたどって移動させる動作を説明するための図である。

【図17】図16(1)に示される滑らかな軌跡71をキャラクタ12がたどるための動作を説明するための図である。

【図18】本考案の実施の他の形態において3次元演算手法によってシューティングゲームを行うときの画面11を示す。

【図19】本考案の実施の他の形態における3次元演

算手法を用いてレーシングゲームを行うときにおける画面11を示す。

【図20】本考案の実施のさらに他の形態におけるキャラクタ12の表示態様の变化を説明するための図である。

【図21】本考案の実施のさらに他の形態の表示態様の变化を説明するための図である。

【図22】本考案の実施のさらに他の形態におけるたとえば格闘ゲームにおける画面11の表示態様の变化を説明するための図である。

【図23】入力操作装置9における中央処理回路24の動作を説明するための本考案の実施の他の形態のフローチャートである。

【図24】図23の動作が行われる際における第1または第2入力操作手段17；18、19から得られる第1または第2検出信号の波形図である。

【図25】ば第1入力操作手段17における操作部材35のキー47を押圧操作した状態から手指を離したときにおける出力端子54から得られる分圧電圧である第1検出信号の波形図である。

【図26】前述の図23および図24に関連する本考案の実施の一形態において可撓線8に処理手段16から導出されるデータ信号のデータ列を示す。

【図27】ゲーム機本体6における図23～図26に関連して前述した入力操作によってゲームの演算処理がマイクロコンピュータ15で行われて画面11に表示される状態を示す図である。

【図28】本考案の実施の他の各形態の第1入力操作手段17の簡略化した平面図である。

【図29】本考案の実施の他の形態における第1入力操作手段17の電極の各組114～117を示す平面図である。

【図30】本考案の実施のさらに他の形態の第1入力操作手段17の簡略化した縦断面図である。

【図31】第2入力操作手段18の断面図である。

【図32】第2入力操作手段18の簡略化した平面図である。

【図33】図31および図32に示される第2入力操作手段18の接続状態を示す電気回路図である。

【図34】本考案の実施の他の形態における第2入力操作手段18の断面図である。

【図35】図34に示される第2入力操作手段18の簡略化した平面図である。

【図36】図34および図35に示される第2入力操作手段18の接続状態を説明する電気回路図である。

【図37】先行技術の押ボタン1、2、3を示す簡略化した断面図である。

【符号の説明】

5 テレビジョン受信機

6 ゲーム機本体

b ; 1 2 6 a, 1 2 6 b 電極

3 1 閉ループ

3 2 感圧部材

3 3 孔

3 5, 4 5, 1 1 1, 1 1 2, 1 1 3, 1 1 8 操作部材

3 6 周辺部

3 7 支持突起

3 8 軸線

3 9 押圧面

4 0 緩衝材

4 1 フランジ

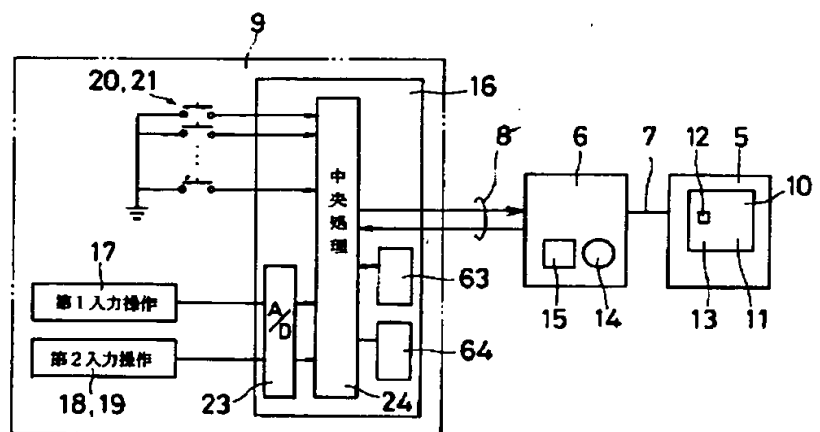
4 3 挿通孔

4 7, 4 8, 4 9, 5 0 キー

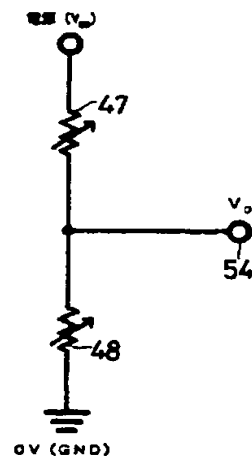
5 2, 5 6 直列回路

5 4, 5 5 出力端子

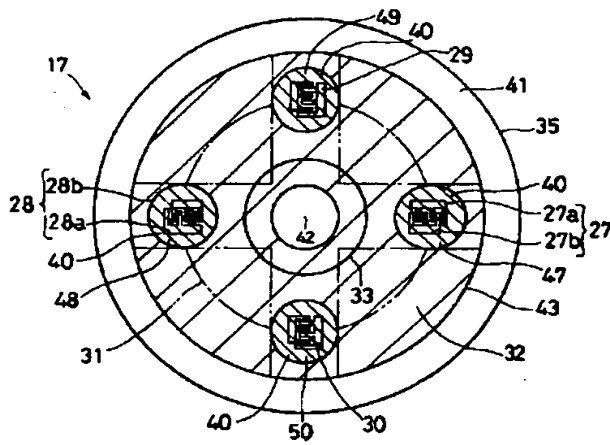
【図 2】



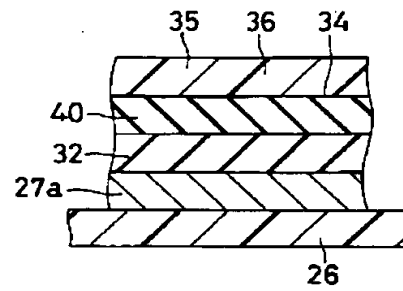
【图9】



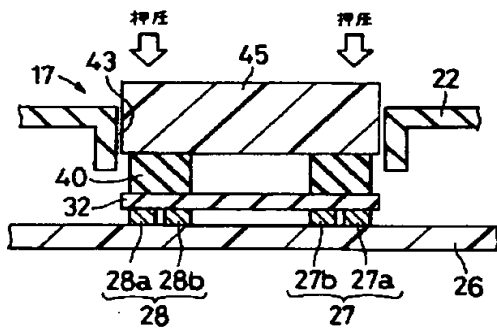
【図4】



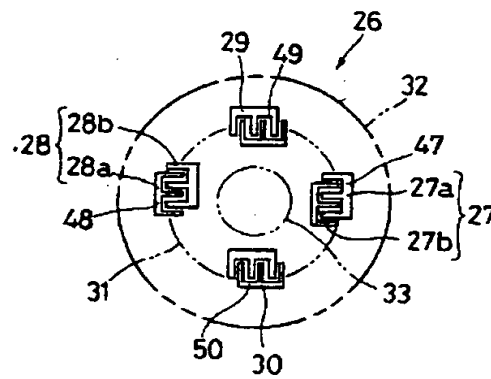
【図5】



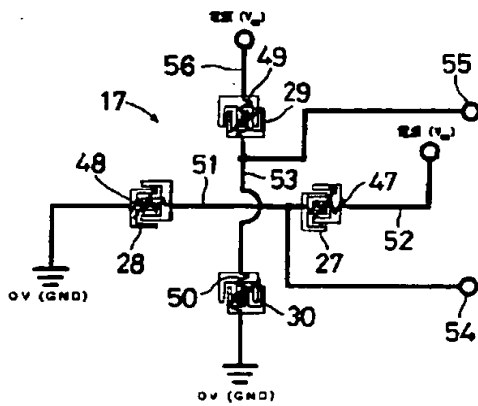
【図6】



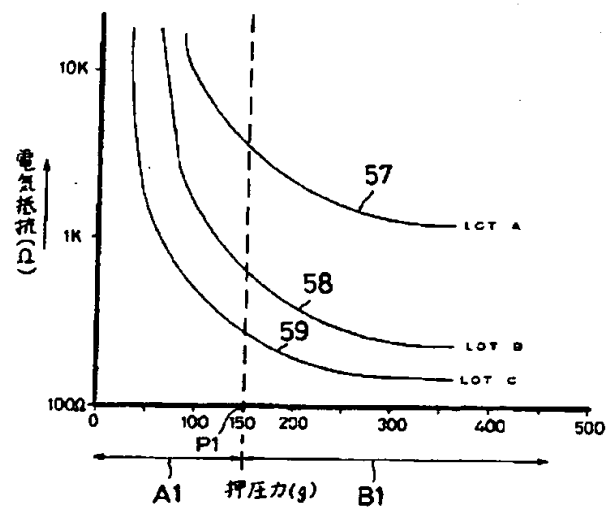
【図7】



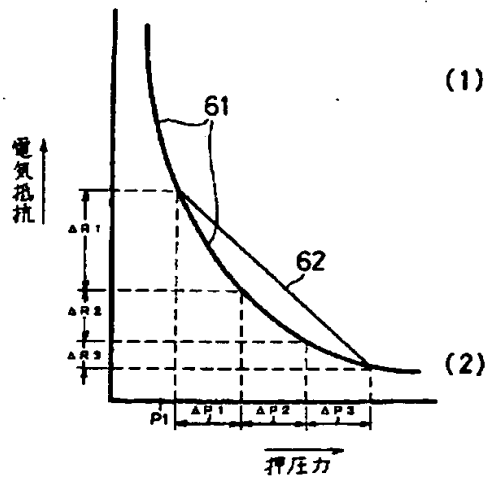
【図8】



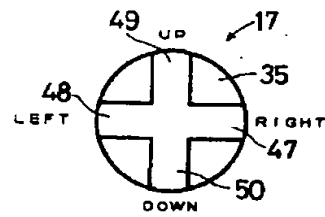
【図10】



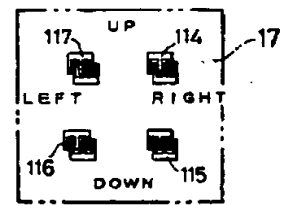
【図11】



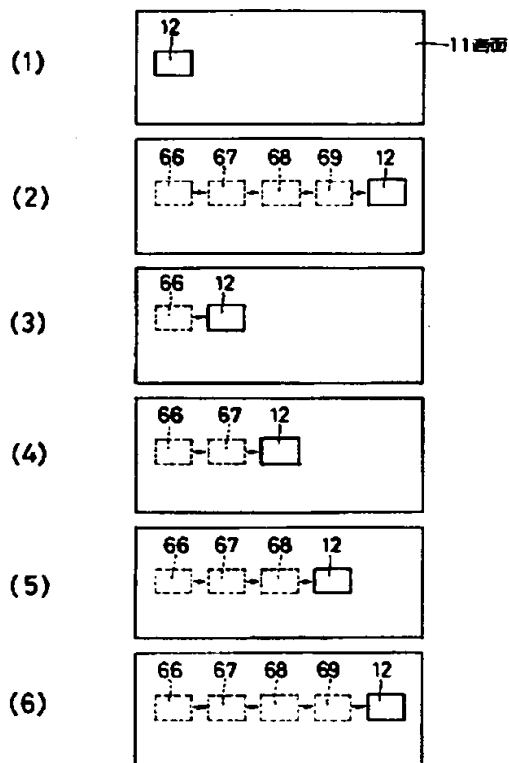
【図13】



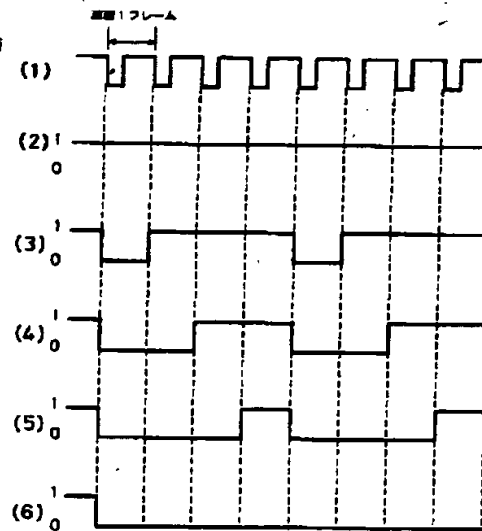
【図29】



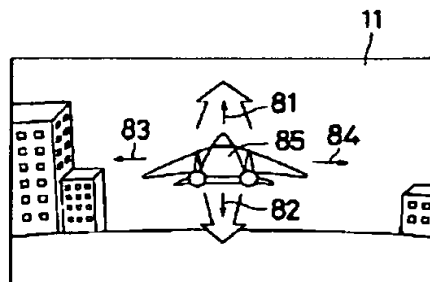
【図14】



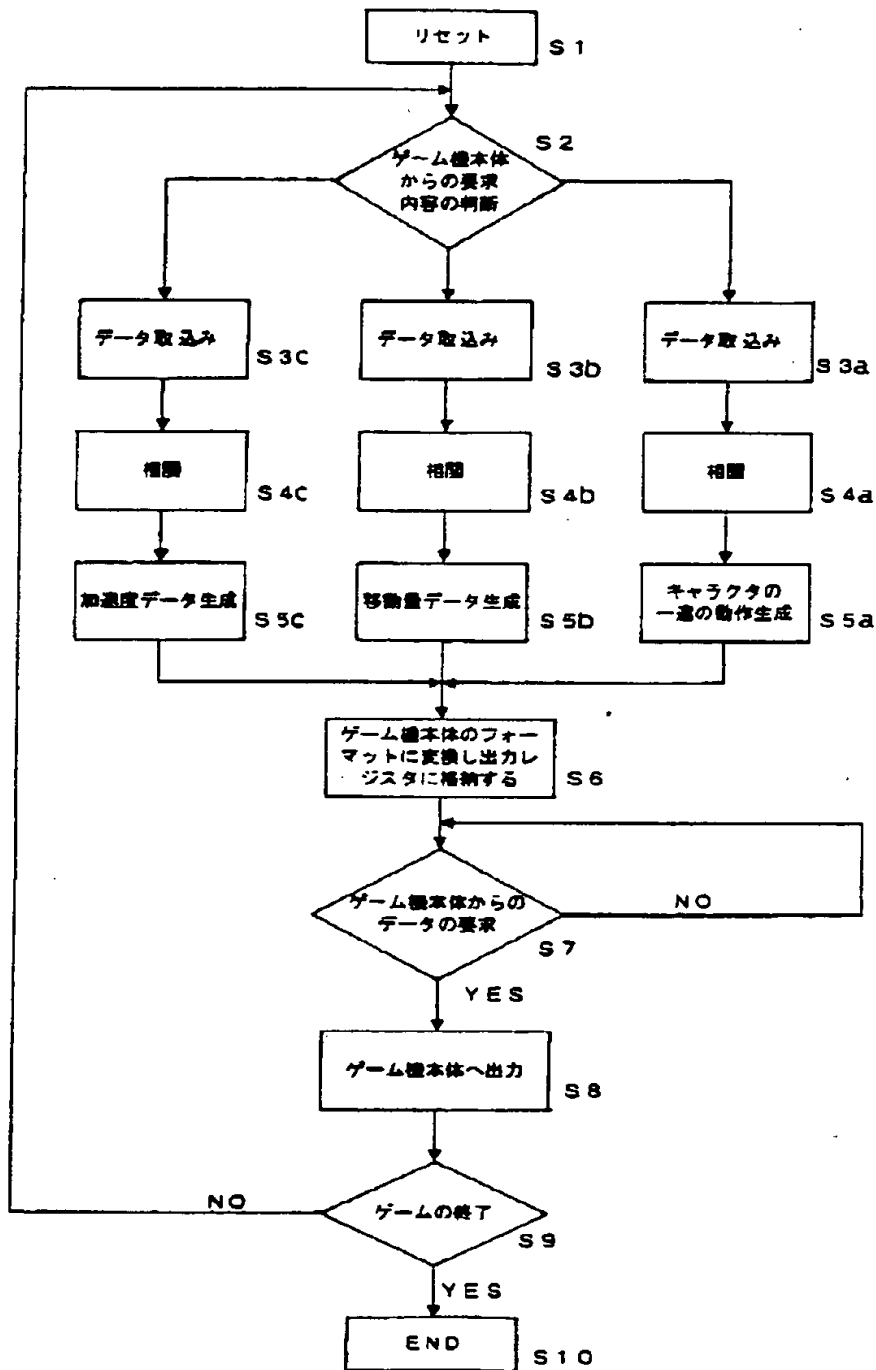
【図15】



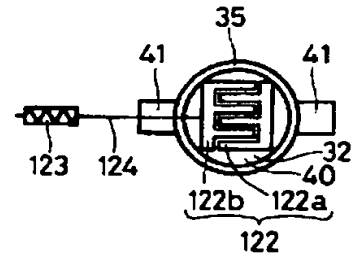
【図18】



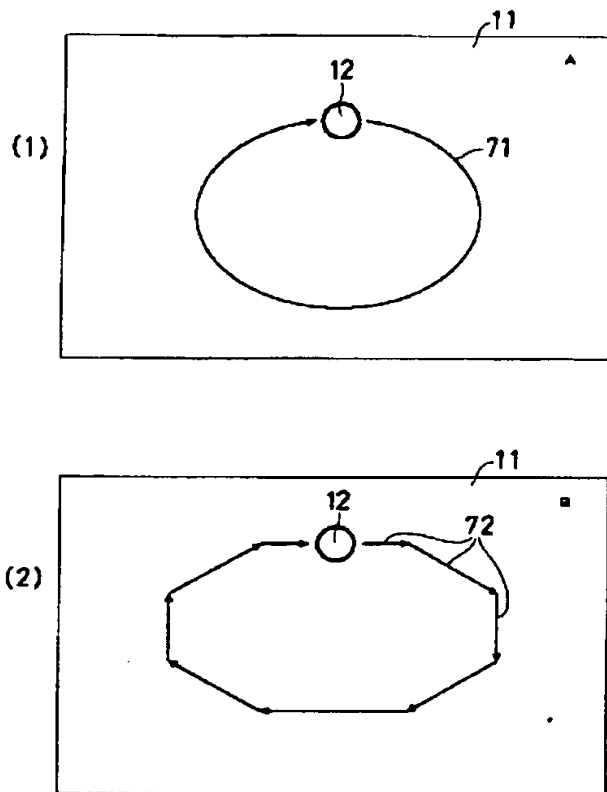
【図12】



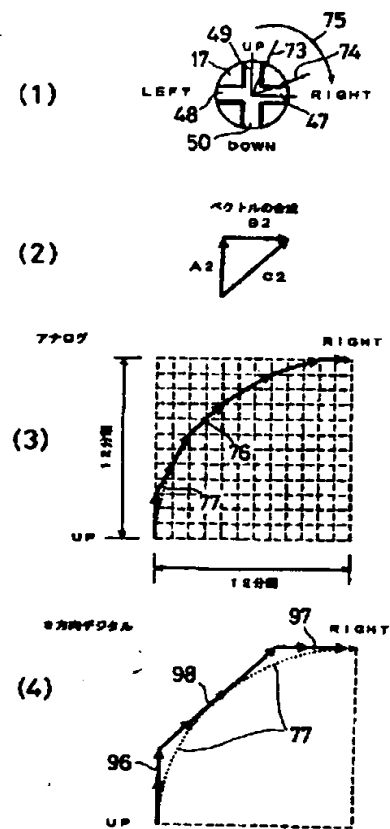
【図32】



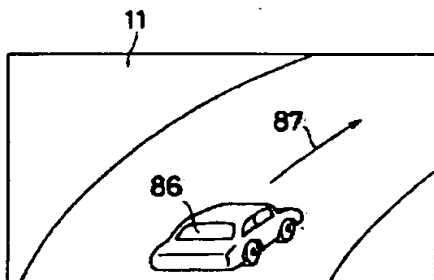
【図16】



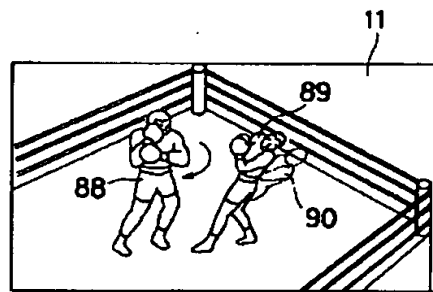
【図17】



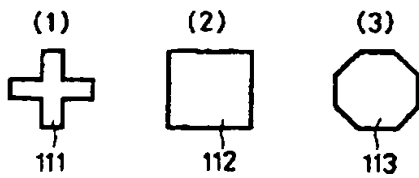
【図19】



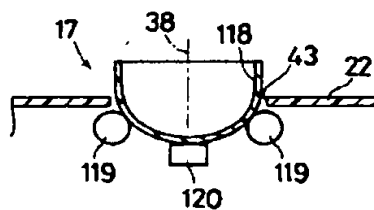
【図21】



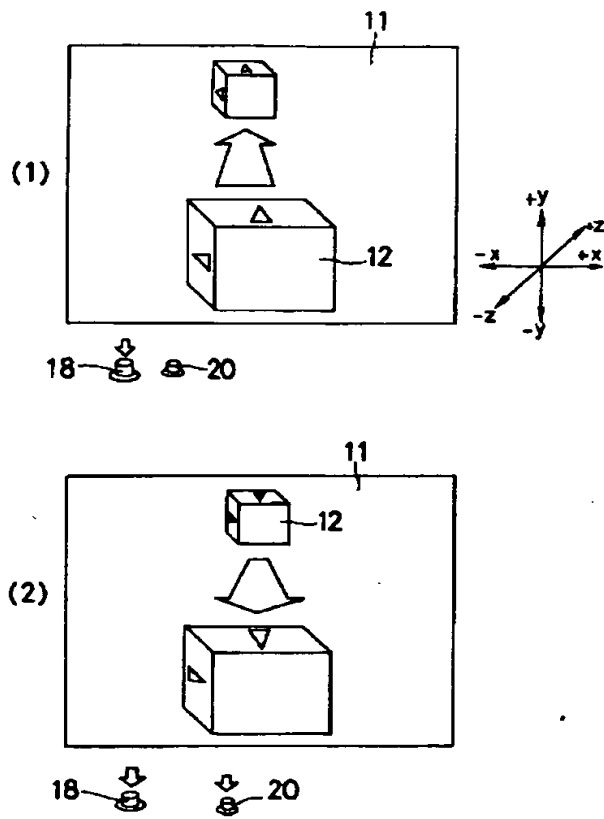
【図28】



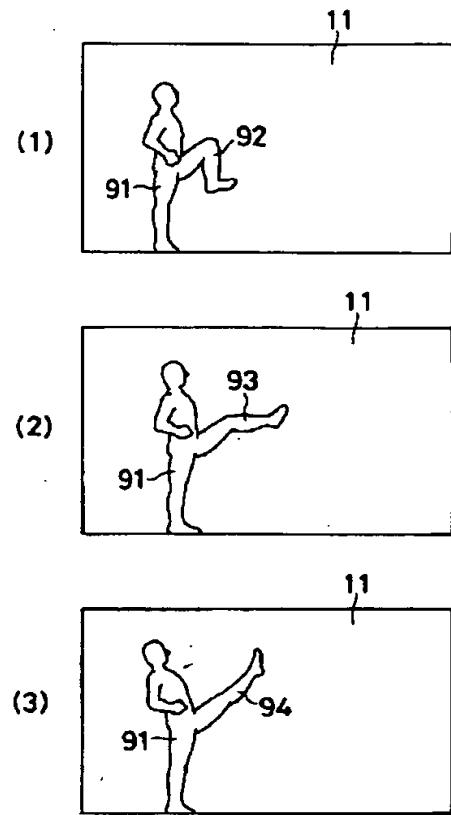
【図30】



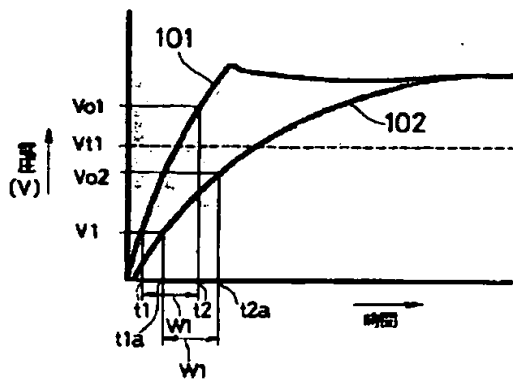
【図20】



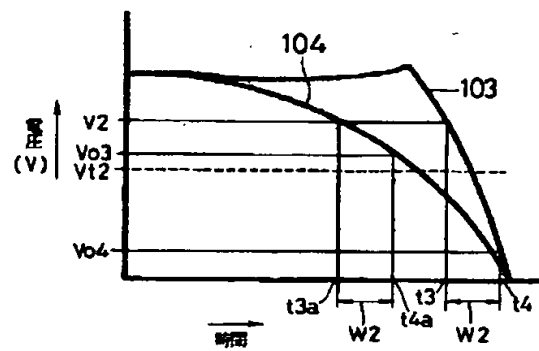
【図22】



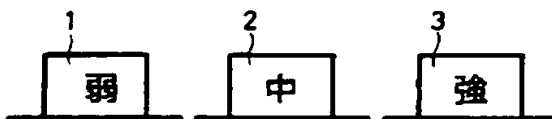
【図24】



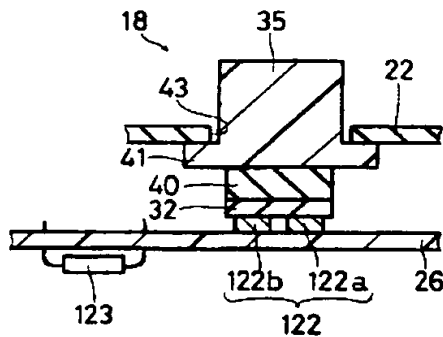
【図25】



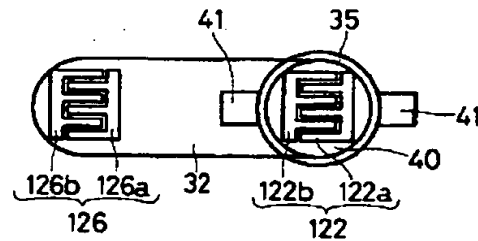
【図37】



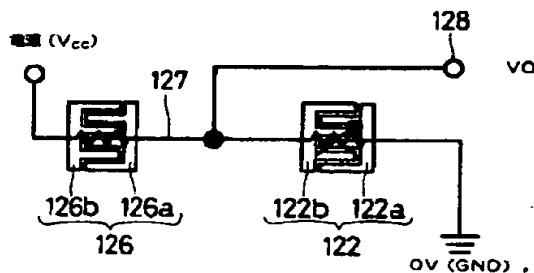
【図31】



【図35】



【図36】



【手続補正書】

【提出日】平成9年3月31日

【手続補正1】

【補正対象書類名】明細書

【補正対象項目名】実用新案登録請求の範囲

【補正方法】変更

【補正内容】

【実用新案登録請求の範囲】

【請求項1】 キャラクタまたは背景の表示態様を変化
する家庭用ビデオゲーム機用入力操作装置であって、
この入力操作装置は、第1、第2および第3の入力操作
手段を有し、

第1の入力操作手段は、操作の位置の全方向を指示する
ための第1加圧手段を有し、その第1加圧手段による押
圧力によって電気的特性が変化するアナログ式の複数の
第1検出装置から成り、その第1検出装置から検出され
た第1検出信号を導出し、

第2の入力操作手段は、直線状の方向を指示する第2加
圧手段を有し、その第2加圧手段による押圧力によって
電気的特性が変化するアナログ式の第2検出装置から成
り、その第2検出装置から検出された第2検出信号を導
出し、

第3の入力操作手段は、非操作状態と操作状態とを検出

する第3検出装置から成り、その第3検出装置は2値の
レベルを導出し、

本件家庭用ビデオゲーム機用入力操作装置は、さらに、
第1、第2および第3の検出信号をインタフェースを介
して取得し、キャラクタまたは背景を操作するための一
連の動作情報を表すデータ信号を生成する検出信号処理
手段と、

ゲーム機本体にデータ信号を導出する通信手段とを有す
ることを特徴とする家庭用ビデオゲーム機用入力操作装
置。

【請求項2】 処理手段は、ゲーム機本体から与えられ
る必要な種類の演算処理を表す指示信号に応答し、その
指示信号が表す演算処理を行うことを特徴とする請求項
1記載の家庭用ビデオゲーム機用入力操作装置。

【請求項3】 検出信号処理手段は、第1または第2検
出信号をアナログ/デジタル変換して取得することを特
徴とする請求項1または2記載の家庭用ビデオゲーム機
用入力装置。

【請求項4】 3次元演算手法によりゲーム内キャラ
クタ等を生成する家庭用ビデオゲーム機用入力操作装
置において、
操作の位置の全方向を指示することができるアナログ式

の第 1 検出信号を発生する第 1 操作手段と、アナログ式の第 2 検出信号を発生する第 2 操作手段と、デジタル式の第 3 検出信号を発生する第 3 操作手段と、複数の演算処理手段を有する処理手段であって、ゲーム機本体が所望する演算処理手段を判断し、第 1 および第 2 検出信号をアナログ／デジタル変換した値を、演算処理手段により予め設定された複数のしきい値に対してどの範囲に属するか 1 回もしくは複数回判断し、その範囲に対応した前記演算処理手段による処理を行わせるべく、ゲーム機本体のフォーマットに適合したデータ信号のデータ列を生成し、ゲーム機本体へ導出する処理手段とを含むことを特徴とする家庭用ビデオゲーム機用入力操作装置。

【請求項 5】 画面に、キャラクタまたは背景の表面を多数の領域に分けて各領域に選択的に陰影を付けて立体的に表示し、または視点位置を変えて立体的に表示する 3 次元演算手法を用い、かつキャラクタまたは背景の表示態様を変化する家庭用ビデオゲーム機用入力操作装置において、操作の位置の全方向を指示するとともに、アナログ式の第 1 検出信号を発生する第 1 入力操作手段と、アナログ式の第 2 検出信号を発生する第 2 入力操作手段と、操作されることによって一方レベルを有し、かつ操作されないことによって他方レベルを有するデジタル式の第 3 検出信号を発生する第 3 入力操作手段と、ゲーム機本体からの必要な種類の演算処理を表す指示信号にตอบสนองし、第 1 および第 2 検出信号をアナログ／デジタル変換し、そのアナログ／デジタル変換された信号またはそのアナログ／デジタル変換された信号を指示信号に対応して演算処理した信号が、予め定める複数の各範囲のうちで属する前記範囲をレベル弁別して判断し、その判断された前記範囲に対応して演算処理されたデータ信号を、ゲーム機本体との通信フォーマットに適合したデータ列で作成して、ゲーム機本体に導出する処理手段とを含むことを特徴とする家庭用ビデオゲーム機用入力操作装置。

【請求項 6】 第 1 または第 2 検出信号は、操作される押圧力に対応したレベルを有することを特徴とする請求項 4 または 5 記載の家庭用ビデオゲーム機用入力操作装置。

【請求項 7】 第 1 または第 2 入力操作手段は、剛性の電気絶縁性配線基板と、配線基板上に相互に隣接して配置される一対の電極と、前記一対の電極にわたって配置され、操作者の手による押圧力によって電極間の電気抵抗が変化する弾発力を有する感圧部材とを含むことを特徴とする請求項 3 または 6 記載の家庭用ビデオゲーム機用入力操作装置。

【請求項 8】 前記一対の電極は、複数の各組を成して設けられ、

感圧部材は、単一枚であって、全ての組の電極にわたって配置され、複数の組の電極は、感圧部材を介して直列回路を形成して接続され、

少なくとも 1 つの組の電極付近の上方で感圧部材上に操作による押圧力が与えられ、

各組の電極間からの分圧電圧を第 1 または第 2 検出信号として導出することを特徴とする請求項 7 記載の家庭用ビデオゲーム機用入力操作装置。

【請求項 9】 第 1 入力操作手段は、

剛性の電気絶縁性配線基板と、

この配線基板上に 3 以上の複数の各組を成して形成される電極であって、各組の電極は、相互に隣接して対を成して配置され、各組の電極は仮想上の閉ループ上に配置される電極と、

単一枚であって、全ての組の電極にわたって配置され、押圧力によって各組の対を成す電極間の電気抵抗が変化する弾発力を有する導電性の感圧部材とを含み、

複数の組の電極は、感圧部材を介して直列回路を形成して接続され、

各組の電極間からの分圧電圧を前記第 1 検出信号として導出することを特徴とする請求項 3、4 または 5 記載の家庭用ビデオゲーム機用入力操作装置。

【請求項 10】 感圧部材の厚み方向の電極とは反対側に、剛性の材料から成る操作部材が設けられ、

この操作部材には、操作部材によって感圧部材が予め圧縮されるように感圧部材の弾発力に抗する変位を制限する変位制限手段が設けられ、

感圧部材が予め圧縮されることによって、操作部材の押圧力の変化量に対応して検出信号のレベルの急激な変化量が生じる範囲外で、操作部材が押圧操作されることを特徴とする請求項 7、8 または 9 記載の家庭用ビデオゲーム機用入力操作装置。

【請求項 11】 前記仮想上の閉ループは、点対称の形状を有し、

電極の対を成す各組は、点対称に配置されて 4 以上の偶数組、設けられ、

剛性の材料から成る操作部材をさらに含み、

この操作部材は、感圧部材の厚み方向の電極とは反対側の表面に配置される周辺部を有し、揺動自在に支持され、

点対称の位置にある 2 組の電極が、感圧部材を介して直列回路を形成して接続されることを特徴とする請求項 9 記載の家庭用ビデオゲーム機用入力操作装置。

【請求項 12】 感圧部材は、中央の孔を有し、前記仮想上の閉ループに沿う環状であり、

操作部材は、前記中央の孔を挿通して配線基板上に支持される支持突起を有し、

操作部材の感圧部材側の表面は、操作部材の軸線から遠ざかるにつれてその軸線方向に前記支持突起から遠ざか

るように傾斜した押圧面を有し、前記押圧面と感圧部材との間に、弾発力を有する緩衝材が介在されていることを特徴とする請求項9または11記載の家庭用ビデオゲーム機用入力操作装置。

【請求項13】 緩衝材は、閉ループの周方向に分断されて各組の直上に配設されていることを特徴とする請求項12記載の家庭用ビデオゲーム機用入力操作装置。

【請求項14】 操作部材には、操作部材によって感圧部材が予め圧縮されるように感圧部材の弾発力に抗する変位を制限する変位制限手段が設けられ、感圧部材が予め圧縮されることによって、操作部材の押圧力の変化量に対応して検出信号のレベルの急激な変化量が生じる範囲外で、操作部材が押圧操作されることを特徴とする請求項11、12または13記載の家庭用ビデオゲーム機用入力操作装置。

【請求項15】 処理手段は、第1または第2検出信号のレベルが、操作物理量の1次関数の値となるデジタル値に変換し、このデジタル値をレベル弁別して判断することを特徴とする請求項3～14のうちの1つに記載の家庭用ビデオゲーム機用入力操作装置。

【請求項16】 処理手段は、第1または第2検出信号の前記アナログ／デジタル変換された値の変化によって、操作された速度を求めて、その変化の速度をレベル弁別して判断することを特徴とする請求項3～15のうちの1つに記載の家庭用ビデオゲーム機用入力操作装置。

【請求項17】 処理手段は、第1または第2検出信号の前記アナログ／デジタル変換された信号を、第1弁別レベル V_1 以上になってから予め定める第1の時間 W_1 経過後に、第1弁別レベル V_1 を超える第2弁別レベル V_2 でレベル弁別することを特徴とする請求項16記載の家庭用ビデオゲーム機用入力操作装置。

【請求項18】 処理手段は、第1または第2検出信号の前記アナログ／デジタル変換された信号を、第3弁別レベル V_3 以下になってから予

め定める第2の時間 W_2 経過後に、第3弁別レベル V_3 未満である第4弁別レベル V_4 でレベル弁別することを特徴とする請求項16記載の家庭用ビデオゲーム機用入力操作装置。

【請求項19】 処理手段は、第1または第2検出信号の前記アナログ／デジタル変換された信号を、1または複数の相互に異なる弁別レベルでレベル弁別することを特徴とする請求項3～15のうちの1つに記載の家庭用ビデオゲーム機用入力操作装置。

【請求項20】 処理手段は、第1および第2検出信号の前記範囲ならびに第3検出信号の相関に対応して、データ信号を作成することを特徴とする請求項4～15のうちの1つに記載の家庭用ビデオゲーム機用入力操作装置。

【請求項21】 処理手段は、第1または第2検出信号の前記アナログ／デジタル変換された信号を、複数の相互に異なる弁別レベルでレベル弁別して前記範囲を判断し、前記範囲に対応して、時間経過に伴って論理値が変化する時系列的なデータ信号を導出することを特徴とする請求項4～15のうちの1つに記載の家庭用ビデオゲーム機用入力操作装置。

【請求項22】 処理手段は、画面の各フレームに同期して、予め定める複数のフレーム数を単位として、それらの複数のフレームのうちの前記判断された範囲に対応した1または複数のフレームでは一方の論理値であり、残余のフレームでは他方の論理値であるデータ信号を時系列的に導出することを特徴とする請求項21記載の家庭用ビデオゲーム機用入力操作装置。

【請求項23】 前記配線基板上に設けられ、一対の電極のうちの一方の電極に直列に接続されて、前記一対の電極間の感圧部材とともに直列回路を形成して分圧電圧を第1または第2検出信号として得る固定抵抗をさらに含むことを特徴とする請求項7記載の家庭用ビデオゲーム機用入力操作装置。

【考案の詳細な説明】**【0001】****【考案の属する技術分野】**

本考案は、家庭用ビデオゲーム機に用いられる入力操作装置に関する。

【0002】**【従来技術】**

従来からの家庭用ビデオゲーム機は、典型的には、表示のために用いられるテレビジョン受信機に、ゲーム機本体が接続され、このゲーム機本体に可撓線で入力操作装置が接続されて構成される。ゲーム機本体には、テレビジョン受信機の陰極線管などの画面に、動作ターゲットまたはキャラクタおよび背景を表示するためのマイクロコンピュータが内蔵されている。入力操作装置には、デジタル式検出信号を導出する複数の押ボタンが備えられ、またアナログ式検出信号を導出する入力操作手段が備えられ、これらの検出信号は、ゲーム機本体に、直接に、またはアナログ／シリアル変換器を介して与えられる。

【0003】

この先行技術では、ゲーム機本体に備えられているマイクロコンピュータによって、キャラクタおよび背景の表示態様の変化、たとえばキャラクタの加速量、移動量、一連の動作情報などを演算処理しているので、このマイクロコンピュータの負担が大きく、したがって演算結果を得るのに時間がかかる。複数の押ボタンを備える従来からの入力操作装置では、この各押ボタンからのデジタル式の2値検出信号がゲーム機本体に与えられる。格闘ゲームにおいて、キャラクタが繰り出すパンチの強さの段階に個別に対応して、図37に示されるように押ボタン1, 2, 3が個別に割り当てられており、これによってパンチの弱、中、強の各段階毎の検出信号を導出される。このような先行技術では、パンチの強さをさらに多数の段階に分けて入力することができず、ゲームの興味が低減されることになる。またキャラクタの動きが不連続的になるので、操作者の意思に対して違和感がある。またこのようなパンチの強さに応じてもっと多くの押ボタン1, 2, 3が設けられる構成とすれば、全体の構成が大形化し、また操作性に関して、多数の押ボタンを使用しようとする、どの押ボタンが強いパンチの攻撃であ

り、どのボタンが弱いパンチの攻撃であるかを常に判断して押ボタンを選ばなければならない、操作が煩雑になるという問題もある。

【0004】

この問題を解決する他の先行技術は、特開平7-88252に開示される。この先行技術では、オプトエンコーダ、トラックボールおよびジョイスティックから成るアナログ式入力デバイスを備え、これらのアナログ式入力デバイスから出力される検出信号を、パラレル／シリアル変換器を介してゲーム機本体に与える。この先行技術では、前述のようにオプトエンコーダ、トラックボールおよびジョイスティックが用いられるので、その構造が複雑であり、部品点数が多く、組立T数がかかり、また大形化し、さらに高い組立精度を必要とする場合があるなどの問題がある。入力操作装置は、操作者が手に持ってその手で、たとえば指などで、操作されるので、小形化が特に要求される。

【0005】

他の先行技術では、アナログ式検出信号を得るために、光学式ロータリエンコーダを用いる。光学式ロータリエンコーダでは、遮光性円板に、周方向に多数のスリットが形成され、このスリットに関連してホトインタラプタが設けられる。このホトインタラプタは、前記円板の軸線方向一方側に発光素子が配置され、他方側に受光素子が配置されて構成される。スリットを介する発光素子からの光に対応した受光素子から得られるパルス数を、カウンタで計数する。

【0006】

この先行技術では、円板の周方向の回転角度の精度を向上するには、スリット数を増大しなければならない、したがってスリットを微細に形成しなければならない。あるいはまた操作者が回転操作する操作部材の回転動力を前記円板に伝達する歯車列の増速比を大きくしなければならない。したがってこの先行技術では、構成が複雑になり、部品点数が多く、大形化し、さらに組立T数がかかり、高価になるという問題がある。

【0007】

他の先行技術は、特開平6-149474に開示され、固定位置で直交座標平面の原点位置を中心として放射線方向の4方向にホール素子を配置し、前記平面

の垂直方向に磁化された磁石を、ホール素子の上方に配置された非磁性台板上で移動し、ホール素子の出力によって磁石位置を指示する構成が開示される。この先行技術では、磁石を台板上で移動させる必要があるため、そのための空間が必要であり、したがって構成が大形化する。またホール素子の出力信号は、微小であるため、その出力を増幅する増幅器を、入力操作装置に内蔵しなければならず、このことによって構成が複雑になる。さらにホール素子の配置位置に高い精度を必要とし、生産性が悪い。

【 0 0 0 8 】

さらに他の先行技術は、特開平 6 - 1 1 9 1 0 5 に開示された光学式ジョイスティックであり、操作者が揺動操作する棒の端部に発光素子が設けられ、この発光素子からの光は、固定位置に設けられた集光レンズを介して、受光素子に結像され、この受光素子は、4 つの受光素子要素が仮想上の正方形の各頂点位置に配置されて形成され、光のスポットの位置に対応した各受光素子要素からの出力が得られる。

【 0 0 0 9 】

この先行技術では、受光素子要素からの出力信号が微小であるため、増幅器が必要となり、このことによって構成が複雑になる。また受光素子要素の配置位置に高い精度が必要であり、生産性が劣る。

【 0 0 1 0 】

さらに他の先行技術は特開平 8 - 1 0 3 5 6 7 に開示される。この先行技術では、左右両手でそれぞれ把持する一対の把持部を、相対的に回動可能に接続し、この回動角度に対応する電気信号を、可変抵抗器を用いて導出する。可変抵抗器は、接触不良などを生じやすく、寿命が短く、また複雑な構成を有し、部品点数が多く、構成が大形化し、さらに組立工数がかかり、高価である。

【 0 0 1 1 】

そこで仮に、構成が簡略化され、小形化され、生産性が優れており、安価な入力操作のための構成を考案することができるとしても、そのような構成は、製品毎の特性のばらつきが大きいので、実際に使用することは困難である。それにもかかわらず製品毎の特性のばらつきを少なくすることが望まれている。

【0012】

【考案が解決しようとする課題】

本考案の目的は、処理手段を内蔵して、従来からのゲーム機本体に備えられているマイクロコンピュータで行っていた演算の一部を、この処理手段で行わせることによって、入力操作による演算結果を短時間に行うことができるようにしてキャラクタおよび背景の表示態様の変化の応答性を向上し、ゲームの興味を向上することができるようにした家庭用ビデオゲーム機用入力操作装置を提供することである。

【0013】

本考案の他の目的は、構成が簡略化され、小形化され、生産性が優れており、安価であるだけではなく、さらに製品毎の特性のばらつきがなくなるようにした改良された家庭用ビデオゲーム機用入力操作装置を提供することである。

【0014】

【課題を解決するための手段】

本考案は、キャラクタまたは背景の表示態様を変化する家庭用ビデオゲーム機用入力操作装置であって、

この入力操作装置は、第1、第2および第3の入力操作手段を有し、

第1の入力操作手段は、操作の位置の全方向を指示するための第1加圧手段を有し、その第1加圧手段による押圧力によって電気的特性が変化するアナログ式の複数の第1検出装置から成り、その第1検出装置から検出された第1検出信号を導出し、

第2の入力操作手段は、直線状の方向を指示する第2加圧手段を有し、その第2加圧手段による押圧力によって電気的特性が変化するアナログ式の第2検出装置から成り、その第2検出装置から検出された第2検出信号を導出し、

第3の入力操作手段は、非操作状態と操作状態とを検出する第3検出装置から成り、その第3検出装置は2値のレベルを導出し、

本件家庭用ビデオゲーム機用入力操作装置は、さらに、

第1、第2および第3の検出信号をインタフェースを介して取得し、キャラクタまたは背景を操作するための一連の動作情報を表すデータ信号を生成する検出

信号処理手段と、

ゲーム機本体にデータ信号を導出する通信手段とを有することを特徴とする家庭用ビデオゲーム機用入力操作装置である。

【0015】

請求項1における検出信号処理手段は、第1および第2のアナログ式の検出信号をアナログ／デジタル変換したデジタル値または第3のデジタル式の検出信号を、ビット直列に導出する構成のみを含んでもよく、さらにそのほかの演算処理動作を行う構成を含んでもよい。

【0016】

請求項1における第1および第2加圧手段は、後述の実施の形態では、指などの手で直接に押圧操作する操作部材35から成ってもよく、また操作の位置の全方向を指示するための第1加圧手段は、後述の図3～図9に関連して説明するような360°にわたって押圧操作される操作部材35であつてもよく、あるいはまた360°にわたって揺動可能なスティックまたはレバーなどの操作棒によって感圧部材などを押圧操作する構成であつてもよく、さらにまた第2加圧手段は、後述の図31～図36に関連して述べるように指などの手で直接に押圧操作する操作部材35であつてもよく、または一軸線まわりに揺動可能なスティックまたはレバーなどの操作棒によって感圧部材などを押圧操作する構成であつてもよく、さらに指などの手で一直線状に操作部材を移動して感圧部材などを押圧操作する構成などであつてもよく、この第2加圧手段は、感圧部材などを直線状の方向に加圧または減圧するための構成を含む。さらにこの第1および第2加圧手段は、感圧部材などを指などの手で直接に押圧操作するときにおける感圧部材自体の押圧操作される表面を含み、これらの第1および第2加圧手段は、押圧手段などを押圧操作する全ての構成を含む。さらに第1および第2加圧手段は、感圧部材を押圧操作する構成だけでなく、たとえばばね力に抗して押圧して被検出片が変位し、その被検出片の移動を光学的構成によって、または磁氣的構成によって、またはそのほかの構成によって検出する構成であつてもよい。

【0017】

第1および第2検出装置は、後述の実施の形態では、電極27～30、122

、126と感圧部材32と固定抵抗123などを含み、また本考案の実施の他の形態では、前記被検出部材の変位を検出する構成であつてもよく、そのほかの構成であつてもよい。

【0018】

第3検出装置は、デジタル式押ボタンであつてもよく、または第2入力操作手段18、19と同様に構成され、そのアナログ／デジタル変換して得たデジタル値を、1つの弁別レベルで2値化する構成を有していてもよく、そのほかの構成によって実現されていてもよく、2値のレベルを導出する構成を全て含む。

【0019】

また本考案は、3次元的演算手法によりゲーム内キャラクタ等を生成する家庭用ビデオゲーム機用入力操作装置において、

操作の位置の全方向を指示できるアナログ式の第1検出信号を発生する第1操作手段と、

アナログ式の第2検出信号を発生する第2操作手段と、

デジタル式の第3検出信号を発生する第3操作手段と、

複数の演算処理手段を有する処理手段であつて、ゲーム機本体が所望する演算処理手段を判断し、第1および第2検出信号をアナログ／デジタル変換した値を、その演算処理手段により予め設定された複数のしきい値に対してどの範囲に属するか1回もしくは複数回判断し、その範囲に対応した前記演算処理手段による処理を行わせるべく、ゲーム機本体のフォーマットに適合したデータ信号のデータ列を生成し、ゲーム機本体へ導出する処理手段とを含むことを特徴とする家庭用ビデオゲーム機用入力操作装置である。

【0020】

また本考案は、画面に、キャラクタまたは背景の表面を多数の領域に分けて各領域に選択的に陰影を付けて立体的に表示し、または視点位置を変えて立体的に表示する3次元的演算手法を用い、かつキャラクタまたは背景の表示態様を変化させる家庭用ビデオゲーム機用入力操作装置において、

操作の位置の全方向を指示するとともに、アナログ式の第1検出信号を発生する第1入力操作手段と、

アナログ式の第2検出信号を発生する第2入力操作手段と、
操作されることによって一方レベルを有し、かつ操作されないことによって他方レベルを有するデジタル式の第3検出信号を発生する第3入力操作手段と、
ゲーム機本体からの必要な種類の演算処理を表す指示信号に応答し、第1および第2検出信号をアナログ／デジタル変換し、そのアナログ／デジタル変換された信号またはそのアナログ／デジタル変換された信号を指示信号に対応して演算処理した信号が、予め定める複数の各範囲のうちで属する前記範囲をレベル弁別して判断し、その判断された前記範囲に対応して演算処理されたデータ信号を、ゲーム機本体との通信フォーマットに適合したデータ列で作成して、ゲーム機本体に導出する処理手段とを含むことを特徴とする家庭用ビデオゲーム機用入力操作装置である。

【0021】

本考案の重要な構成は、入力操作装置に、アナログ式の第1および第2検出信号を発生する第1および第2入力操作手段を設けて、たとえば3次元の演算手法によって画面のキャラクタまたは背景の表示態様をたとえば連続的に変化させることができるようにするというだけでなく、さらに、

入力操作装置に、マイクロコンピュータなどによって実現される処理手段を設け、この処理手段によって演算処理を分担させることである。

【0022】

したがって上述のように入力操作装置に備えられている処理手段によって、従来からゲーム機本体に設けられるマイクロコンピュータの演算処理の少なくとも一部分を行わせることができるので、ゲーム機本体側の負担を軽減させることができる。したがって第1、第2および第3入力操作手段の操作によるゲーム機本体のマイクロコンピュータによって演算結果を得るのに必要な時間を短縮することができ、その分、ゲーム機本体のマイクロコンピュータは他の演算処理を行うことができ、ゲームにおけるキャラクタおよび背景の表示態様の变化をさらにスピードアップさせることが可能となり、ゲームの興味を向上することができる。

【0023】

また本考案は、処理手段は、ゲーム機本体から与えられる必要な種類の演算処

理を表す指示信号に応答し、その指示信号が表す演算処理を行うことを特徴とする。

【0024】

さらに、処理手段は、常に多くの演算処理を行っているというのではなく、請求項2、4のように、指示信号の指示する演算処理だけを行い、無駄な演算処理は行わず、これによって演算結果を得る時間を短縮することができる。

【0025】

請求項3における処理手段に備えられている演算処理手段というのは、前掲の実用新案登録請求の範囲請求項14～21などの各演算処理を行う構成、またはそのほかの演算処理を行う構成を含む。アナログ／デジタル変換した値を、どの範囲に属するか複数回判断するというのは、前掲の実用新案登録請求の範囲請求項15～17のように、操作された速度を求めるために、時間間隔をあけて2回以上、アナログ／デジタル変換して演算処理を行うことを含む。

【0026】

請求項3の処理手段は、ゲーム機本体が所望する演算処理手段を判断し、この所望する演算処理手段というのは、ゲーム機本体のマイクロコンピュータからの指示信号が指定する演算処理手段であってもよく、または本件入力操作装置に備えられている操作者によって操作される切換えスイッチなどによってその演算処理手段を切換えて動作させる構成などを含む。

【0027】

請求項1、4におけるキャラクタまたは背景の表示態様の変化というのは、そのキャラクタ自体または背景自体の移動などして変化することを含むとともに、キャラクタまたは背景の少なくとも一部分、たとえばキャラクタが人体であるとき、その人体の一部分、たとえば体幹または下肢などが移動などして変化することを含む。

【0028】

請求項2、4における指示信号は、命令であるコマンドを表す信号であってもよく、またはゲーム機本体から請求項1の検出信号処理手段または請求項3、4の処理手段に与えられる演算処理を実行するプログラムを表す信号であってもよ

く、このプログラムに従って前記検出信号処理手段または前記処理手段が演算処理を実行する。

【0029】

この処理手段は、ゲーム機本体に備えられているマイクロコンピュータなどから送信される指示信号の所望する演算処理内容に対応して、第1および第2検出信号をインタフェースによるアナログ／デジタル変換した信号が、またはたとえば請求項14～17のように指示信号に対応して演算処理した信号が、予め設定された1または複数の弁別レベルに対してどの範囲に属するかを、1回または複数回判断し、前記判断された範囲に対応して演算処理されたデータ信号をゲーム機本体の通信フォーマットに適合したデータ列で生成してゲーム機本体に導出する。

【0030】

本考案に従えば、処理手段は、第1および第2検出信号のアナログ／デジタル変換された信号をそのままレベル弁別して範囲を判断し、またはそのアナログ／デジタル変換された信号をゲーム機本体からの指示信号に対応して演算処理した信号をレベル弁別して判断し、この演算処理というのは、前掲の実用新案登録請求の範囲請求項14および請求項15、16、17、ならびにその他の演算処理を含む。さらにデータ信号は、その判断された前記範囲に対応して演算処理されて、ゲーム機本体からの通信フォーマットに適合したデータ列で作成されて導出され、この演算処理されたデータ信号というのは、前記判断された範囲を表す信号であってもよく、またデータ列となるように作成された信号であってもよく、または前掲の実用新案登録請求項の範囲請求項18および請求項19ならびにその他の演算処理したデータ信号であってもよい。

【0031】

本考案に従えば、ゲーム機本体に備えられているマイクロコンピュータは、入力操作装置からのデータ信号に応答し、テレビジョン受信機などの陰極線管などの表示手段の画面に、3次元的演算手法でキャラクタまたは背景を表示する。この3次元的演算手法は、キャラクタであるたとえば球の表面を多数の小さな領域に分けて、各領域に選択的に陰影を付けて立体的に表示する演算手法であり、ま

たこの3次元的演算手法は、たとえば背景となる建物を見る視点位置を変えて建物の外から内に入り込んだ視点から立体的に表示し、たとえばその建物の正面、側面、背面、内面などを見ることができるように表示する演算手法である。このような3次元的演算手法によって、ゲームの興味を向上することができるようになる。

【0032】

また本考案は、第1または第2検出信号は、操作される押圧力に対応したレベルを有することを特徴とする。

【0033】

請求項1、3および4における第1および第2入力操作手段は、オプトエンコーダまたは光学式ロータリエンコーダ、トラックボール、ジョイスティックおよびホール素子などの磁気検出素子を用いた構成、光学式ジョイスティック、可変抵抗器などを用いた構成であってもよく、または操作によって静電容量が変化する構成であってもよく、さらに次に述べる手の押圧力によって変化するレベルを有する電気信号を導出する構成などであってもよい。

【0034】

請求項1および5の本考案に従えば、第1または第2入力操作手段によるアナログ操作によって、操作者の手のたとえば指などによって操作される押圧力に対応したレベルを有する第1または第2検出信号を導出する。すなわち第1または第2検出信号は、操作者の指などを含む手による押圧力に対応したレベルを有する電気信号である。これによって第1または第2入力操作手段の構成の小形化を図ることができ、入力操作装置におけるハウジングの外表面の場所の取合いの問題を解決することが容易であり、さらに操作性が良好である。

【0035】

また本考案は、第1または第2入力操作手段は、
剛性の電気絶縁性配線基板と、
配線基板上に相互に隣接して配置される一対の電極と、
前記一対の電極にわたって配置され、操作者の手による押圧力によって電極間の電気抵抗が変化する弾発力を有する感圧部材とを含むことを特徴とする。

【0036】

本考案に従えば、感圧部材を、指などを含む手で押圧操作することによって、配線基板上の一对の電極間の感圧部材を介する電気抵抗が変化し、したがってその押圧力に対応したレベルを有する電気信号を導出することができる。この構成によれば、1つの配線基板上に一对の電極が形成されること、および感圧部材を用いることによって、構成が簡略化され、小形化され、生産性が優れており、したがって安価に実現される。

【0037】

請求項5、6において、第1または第2検出信号は、操作される押圧力に対応したレベルを有し、この押圧力に対応したレベルを有する第1または第2検出信号を得るために、感圧部材を用いるようにしてもよく、このような感圧部材は、操作者の手の押圧力が、後述の実施の形態において操作部材35から直接に作用するように構成されていてもよく、またはその操作部材35が省略されて感圧部材32の表面を操作者の指などで直接に押圧操作する構成であってもよく、さらに本考案の実施の他の形態では、スティックまたはレバーなどの操作棒によって、または移動する部材などによって、感圧部材を押圧する構成を含む。

【0038】

本考案では、このように押圧力は、感圧部材に直接に作用してもよいけれども、操作者の操作によって運動する構成要素を介して押圧する構成であってもよく、さらには感圧部材を用いることなく、ばねのばね力によって移動する部材を、操作者が手などで押圧し、その部材の変位を、光学的構成、磁氣的構成、さらにそのほかの構成を用いて検出信号に変換する構成としてもよい。

【0039】

したがって前記の実用新案登録請求の範囲における操作による押圧力などは、操作者の指などの手で感圧部材を直接に押圧する構成だけでなく、そのほかの構成要素を介して感圧部材を押圧する構成を含み、さらにたとえばコイルばねなどに抗して移動する部材の変位を検出する構成、さらにはそのほかの構成などを含むものと解釈されなければならない。

【0040】

また本考案は、前記一对の電極は、複数の各組を成して設けられ、感圧部材は、単一枚であって、全ての組の電極にわたって配置され、複数の組の電極は、感圧部材を介して直列回路を形成して接続され、少なくとも 1 つの組の電極付近の上方で感圧部材上に操作による押圧力が与えられ、

各組の電極間からの分圧電圧を第 1 または第 2 検出信号として導出することを特徴とする。

【 0 0 4 1 】

本考案に従えば、複数の各組は、一对の電極を有し、単一枚の感圧部材は、すべての組の電極にわたって配置され、すなわちすべての組の電極にわたって、共通の感圧部材が用いられているので、感圧部材の特性のばらつきによる押圧力に対応した電気抵抗の変化のばらつきをできるだけ防ぐことができる。

【 0 0 4 2 】

しかも本考案に従えば、複数の組の電極は、感圧部材を介して直列回路を形成して接続されるので、各組の電極間から得られる分圧電圧は、その直列回路の両端に与えられる電圧の感圧部材による電気抵抗の比に対応する。このことによって、感圧部材の押圧力に対応する電気抵抗の特性のばらつきが存在しても、すなわち入力操作装置毎に感圧部材の特性が異なっても、そのような特性のばらつきによる処理手段に与えられるアナログ式の第 1 または第 2 検出信号のレベルのばらつきをなくすることができるようになる。さらに分圧電圧を、比較的大きなレベルで得ることが容易であるので、増幅器を必要としない。

【 0 0 4 3 】

また本考案は、第 1 入力操作手段は、

剛性の電気絶縁性配線基板と、

この配線基板上に 3 以上の複数の各組を成して形成される電極であって、各組の電極は、相互に隣接して対を成して配置され、各組の電極は仮想上の閉ループ上に配置される電極と、

単一枚であって、全ての組の電極にわたって配置され、押圧力によって各組の対を成す電極間の電気抵抗が変化する弾発力を有する導電性の感圧部材とを含み

複数の組の電極は、感圧部材を介して直列回路を形成して接続され、
各組の電極間からの分圧電圧を前記第1検出信号として導出することを特徴とする。

【0044】

本考案に従えば、操作の位置の全方向を指示するための第1入力操作手段は、
仮想上の閉ループ上に、3以上の各組の電極が配置されて構成される。この閉ループは、たとえば真円であって、各組は、周方向に90度ずつ間隔をあけて合計4組配置されていてもよく、この電極の各組は、少なくとも3以上配置される。
これによって各電極に対応する分圧電圧を得ることによって、押圧位置を全方向にわたって知ることができる。

【0045】

また本考案は、前記仮想上の閉ループは、点対称の形状を有し、
電極の対を成す各組は、点対称に配置されて4以上の偶数組、設けられ、
剛性の材料から成る操作部材をさらに含み、
この操作部材は、感圧部材の厚み方向の電極とは反対側の表面に配置される周辺部を有し、揺動自在に支持され、
点対称の位置にある2組の電極が、感圧部材を介して直列回路を形成して接続されることを特徴とする。

【0046】

本考案に従えば、仮想上の閉ループは点対称の形状を有し、たとえば前述のように真円であってもよく、電極の対を成す各組は、4以上の偶数組、設けられ、
特に本考案では、点対称の位置にある2組の電極が、感圧部材を介して直列回路を形成して接続されており、揺動自在の剛性の操作部材を用いることによって、
点対称な位置にある2つの各組のうち、一方の組で押圧操作されているとき、他方の組では押圧操作されず、この押圧操作されない組の電極間の感圧部材による電気抵抗を、分圧電圧を得るために利用することができる。こうして分圧電圧を得るために別途、固定抵抗などを準備する必要がなく、構成の簡略化を図ることができる。後述の緩衝材は、省略され得る。

【0047】

また本考案は、感圧部材は、中央の孔を有し、前記仮想上の閉ループに沿う環状であり、

操作部材は、前記中央の孔を挿通して配線基板上に支持される支持突起を有し

、
操作部材の前記周辺部の感圧部材側の表面は、操作部材の軸線から遠去かるにつれてその軸線方向に前記支持突起から遠去かるように傾斜した押圧面を有し、

前記押圧面と感圧部材との間に、弾発力を有する緩衝材が介在されていることを特徴とする。

【0048】

本考案に従えば、操作部材は、環状の感圧部材の中央の孔を挿通する支持突起を有し、この支持突起が配線基板上に支持されて支持部材が揺動自在とされ、したがって閉ループの対称な2つの位置の一方で押圧操作されるとき、他方の位置では押圧力が作用することがなく、分圧電圧を、押圧位置に対応して正確に得ることができる。

【0049】

さらに本考案に従えば、操作部材の周辺部の感圧部材側の表面は、操作部材の軸線から遠去かるにつれて軸線方向に前記支持突起が遠去かるように、たとえば円錐台状に形成された押圧面を有し、この押圧面と感圧部材との間に緩衝材が介在される。したがって、操作部材が押圧操作されたとき、緩衝材を介して感圧部材には対称点から放射方向にできるだけ均一な圧力で押圧されることになる。そのため、感圧部材に部分的に大きな押圧力が作用することはなく、感圧部材の破損を防ぐことができるとともに、配線基板上に形成されている各組の一对の電極に、対称点から放射方向に均一な押圧力が感圧部材によって作用し、押圧力に依存する安定した電気抵抗を得ることができる。

【0050】

また本考案は、緩衝材は、閉ループの周方向に分断されて各組の直上に配設されていることを特徴とする。

【0051】

本考案に従えば、操作部材の周辺部における閉ループの周方向に沿う各組の中間の位置を押圧操作したとき、前記中間の位置を正確に表す各組の第1検出信号が得られる。

【0052】

また本考案は、感圧部材の厚み方向の電極とは反対側に、剛性の材料から成る操作部材が設けられ、

この操作部材には、操作部材によって感圧部材が予め圧縮されるように感圧部材の弾発力に抗する変位を制限する変位制限手段が設けられ、

感圧部材が予め圧縮されることによって、操作部材の押圧力の変化量に対応して検出信号のレベルの急激な変化量が生じる範囲外で、操作部材が押圧操作されることを特徴とする。

【0053】

また本考案は、操作部材には、操作部材によって感圧部材が予め圧縮されるように感圧部材の弾発力に抗する変位を制限する変位制限手段が設けられ、

感圧部材が予め圧縮されることによって、操作部材の押圧力の変化量に対応して検出信号のレベルの急激な変化量が生じる範囲外で、操作部材が押圧操作されることを特徴とする。

【0054】

本考案に従えば、操作部材が操作者の指などの手によって押圧操作していない状態であっても、一定の圧力が感圧部材に予め加えられて圧縮するように押圧力が作用される。これによって手による押圧力の変化量に対応した検出信号のレベルの緩やかな変化量が生じる範囲で、押圧操作による検出信号を得ることができるようになる。したがって手による押圧力のわずかな変化量に対応して検出信号のレベルが大きく変動することはなく、操作性が良好となる。

【0055】

また本考案は、処理手段は、第1または第2検出信号のレベルが、操作物理量の1次関数の値となるデジタル値に変換し、このデジタル値をレベル弁別して判断することを特徴とする。

【0056】

本考案に従えば、第1または第2検出信号のレベルが、操作物理量、たとえば指などの手による押圧力、または操作変位量などの1次関数の値となるデジタル値に変換され、こうして非直線的な特性の値が直線的な値に変換されて、レベル弁別のために用いることができる。したがって第1または第2入力操作手段の特性に拘わらず、処理手段における後続の演算処理を正確にかつ容易に行うことができる。

【0057】

また本考案は、処理手段は、第1または第2検出信号の前記アナログ／デジタル変換された値の変化の速度を求めて、その変化の速度をレベル弁別して判断することを特徴とする。

【0058】

本考案に従えば、第1または第2検出信号のアナログ／デジタル変換された値、たとえば7ビットから成るデジタル式信号の場合には、0～127を表す値の変化の速度を求め、たとえば押圧操作による押圧力に対応したデジタル値の時間変化率を求めて、その変化の速度をレベル弁別して複数の範囲のうちの1つを判断し、その判断された範囲に対応して演算処理されたデータ信号を導出する。これによってゲームにおけるキャラクタまたは背景の表示態様の変化を多様化することができ、ゲームの興味を向上することができる。またこのような演算処理は、実行ステップ数が比較的多く、したがって従来からのゲーム機本体に備えられているマイクロコンピュータによって達成しようとする、演算結果を得るまでに長い時間を必要とするけれども、本考案では、このような演算処理を、入力操作装置に備えられているマイクロコンピュータなどの処理手段によって行うので、演算結果を得るのに長い時間を必要とせず、ゲームのスピードアップを図ることができる。

【0059】

また本考案は、処理手段は、

第1または第2検出信号の前記アナログ／デジタル変換された信号を、第1弁別レベル V_1 以上になってから予め定める第1の時間 W_1 経過後に、第1弁別レベル V_1 を超える第2弁別レベル V_{t1} でレベル弁別し、または

処理手段は、第1または第2検出信号の前記アナログ／デジタル変換された信号を、第3弁別レベル V_2 以下になってから予め定める第2の時間 W_2 経過後に、第3弁別レベル V_2 未満である第4弁別レベル V_{t2} でレベル弁別することを特徴とする。

【0060】

本考案に従えば、後述の図24および図25に示されるように、第1または第2入力操作手段における操作の正または負の速度、すなわち時間変化率を、レベル弁別によって求めることができる。

【0061】

また本考案は、処理手段は、第1または第2検出信号の前記アナログ／デジタル変換された信号を、1または複数の相互に異なる弁別レベルでレベル弁別することを特徴とする。

【0062】

本考案に従えば、第1または第2検出信号のデジタル値を、1つの弁別レベルでレベル弁別し、こうしてデジタル式の2値信号を得ることができ、あるいはまたこのデジタル値を相互に異なる複数の弁別レベルでレベル弁別し、3以上の範囲に分けて判断することができるようになる。特にアナログ式の第1または第2検出信号を上述のように複数の弁別レベルでレベル弁別することによって、従来からたとえば格闘ゲームにおけるパンチの強さを前述の図37では3つの段階に分けて入力することができるけれども、本考案では、さらに多数の段階に分けて、しかも単一の第1または第2操作手段によって入力することができ、構成の小形化を図ることができるとともに、操作者の感覚により一層沿ったキャラクタまたは背景の表示態様の変化を実現することができる。

【0063】

また本考案は、処理手段は、第1および第2検出信号の前記判断された範囲ならびに第3検出信号の相関に対応して、データ信号を作成することを特徴とする。

【0064】

本考案に従えば、第1～第3入力操作手段の操作によって得られる第1～第3

の各検出信号の組合わせパターンである相関に対応して、データ信号が作成される。したがってゲームにおけるキャラクタまたは背景の表示態様の多くの変化を得ることができる。

【0065】

また本考案は、処理手段は、第1または第2検出信号の前記アナログ／デジタル変換された信号を、複数の相互に異なる弁別レベルでレベル弁別して前記範囲を判断し、前記判断された範囲に対応して、時間経過に伴って論理値が変化する時系列的なデータ信号を導出することを特徴とする。

【0066】

本考案に従えば、第1または第2入力操作手段の操作によって、時系列的に変化するデータ信号を導出してゲーム機本体に与えることができる。これによってゲームにおける画面のキャラクタまたは背景の表示態様を、さらに多く変化させることができる。しかもこのような演算処理は、比較的多くのステップ数を必要とし、先行技術ではゲーム機本体に備えられているマイクロコンピュータなどによって実現させる必要があるけれども、本考案ではこのような演算処理を、入力操作装置に備えられている処理手段によって実行するので、ゲーム機本体のマイクロコンピュータの負担を軽減し、ゲームのスピードアップを向上することができる。

【0067】

また本考案は、処理手段は、画面の各フレームに同期して、予め定める複数のフレーム数を単位として、それらの複数のフレームのうちの前記判断された範囲に対応した1または複数のフレームでは一方の論理値であり、残余のフレームでは他方の論理値であるデータ信号を時系列的に導出することを特徴とする。

【0068】

本考案に従えば、図15に関連して後述するように、テレビジョン受信機などの表示手段における画面の各フレームに同期してキャラクタまたは背景の表示態様を変化させることができるようになる。たとえば第1または第2入力操作手段が押圧操作される構成を有するとき、その押圧力に対応して得られる第1または第2検出信号に従って、キャラクタまたは背景のたとえば移動速度を変化させる

ことができる。

【0069】

また本考案は、前記配線基板上に設けられ、一対の電極のうちの一方の電極に直列に接続されて、前記一対の電極間の感圧部材とともに直列回路を形成して分圧電圧を第1または第2検出信号として得る固定抵抗をさらに含むことを特徴とする。

【0070】

本考案に従えば、図31～図33に関連して後述するように、一対の電極が形成された配線基板上に、さらに分圧電圧を得るために直列回路を形成する固定抵抗が設けられる。したがって組立作業が容易になるとともに、構成を簡略化して小形化することも可能である。

【0071】

【考案の実施の形態】

図1は本考案の実施の一形態の全体の構成を簡略化して示す平面図であり、図2はその家庭用ビデオゲーム機の全体の構成を簡略化して示すブロック図である。家庭用ビデオゲーム機は、基本的には、表示のために用いられるテレビジョン受信機5に、ゲーム機本体6がライン7を介して接続され、このゲーム機本体6に入力／出力インタフェース65から可撓線8でコントローラである入力操作装置9が接続されて構成される。テレビジョン受信機5の陰極線管または液晶などの表示手段10の画面11には、キャラクタ12および背景13が表示される。ゲーム機本体6は、ゲームのプログラムが記録された記録媒体であるディスク14と、そのプログラムを読出して可撓線8を介する入力操作装置9からのデータ信号に応答して演算処理し、テレビジョン受信機5の表示のための映像信号を作成するマイクロコンピュータ15などを含む。

【0072】

このマイクロコンピュータ15は、3次元的演算手法によって、表示手段10の画面11に、キャラクタ12または背景13の表面を多数の領域に分けて各領域に選択的に陰影を付けて立体的に表示する演算処理を行い、または視点位置を変えて立体的に表示する演算処理を行う。さらにこのマイクロコンピュータ15

は、入力操作装置9からのデータ信号に応答してキャラクタ12または背景13の表示態様を変えるための演算処理を行う。ゲーム機本体6からテレビジョン受信機5に与えられる映像信号の水平／垂直同期信号に同期した同期信号はまた、入力操作装置9に備えられているマイクロコンピュータなどによって実現される処理手段16に与えられ、これによって処理手段16は、データ信号を、ゲーム機本体6との通信フォーマットに適合したデータ列で作成して、導出する。

【0073】

入力操作装置9は、アナログコントロールボタンである第1入力操作手段17と、アナログ多目的ボタンである第2入力操作手段18、19と、デジタル式押ボタンである複数の第3入力操作手段20、21が、操作者の手によって把持されるハウジング22に設けられて構成される。第1入力操作手段17は、ハウジング22の左部に配置され、操作者のたとえば左手の指などで押圧操作され、その操作位置の全方向を指示するアナログ式の第1検出信号を発生し、これによってゲーム内のキャラクタ12および背景13の移動の方向性を指示することができる。第2入力操作手段18、19はハウジング22の前部の左右に配置され、ゲーム内の各種用途に使用され、アナログ式の第2検出信号を発生する。これらの第1および第2入力操作手段17；18、19からの第1および第2検出信号は、アナログ／デジタル変換器23を介して処理手段16の中央処理回路24に与えられる。第3入力操作手段20、21は、ハウジング22のたとえば中央および右部に配置され、押圧操作されることによって一方レベル、たとえばハイレベルを有し、かつ押圧操作されないことによって他方レベル、たとえばローレベルを有するデジタル式の第3検出信号を発生し、処理手段16の中央処理回路24に与える。

【0074】

処理手段16に備えられる中央処理回路24は、ゲーム機本体6のマイクロコンピュータ15からの指示信号に応答し、インタフェースとして働くアナログ／デジタル変換器23を動作させて第1および第2入力操作手段17；18、19からの第1および第2検出信号をアナログ／デジタル変換させる。この指示信号は、中央処理回路24において演算処理すべき必要な処理を表す信号である。中

中央処理回路24は、そのアナログ／デジタル変換された信号が、またはそのアナログ／デジタル変換された信号を指示信号に対応してたとえば後述のように押圧力の1次関数の値となるデジタル変換値を求めるように演算処理した信号が、予め定める複数の各範囲のうちで属する前記範囲をレベル弁別することによって判断し、その判断された前記範囲に対応して演算処理して得られたデータ信号を、ゲーム機本体6のマイクロコンピュータ15との通信フォーマットに適合したデータ列で作成して導出する。

【0075】

指示信号は、コマンド、インストラクションおよび中央処理回路24において演算処理を実行するためのコンピュータプログラムを表す信号であつてもよく、そのほかの情報を含む信号であつてもよい。

【0076】

図3は第1入力操作手段17の縦断面図であり、図4はその第1入力操作手段17の簡略化した平面図であり、図5は図3の切断面線V-Vから見た断面図である。これらの図面を参照して、剛性の電気絶縁性配線基板26はたとえば紙フェノールなどの合成樹脂から成り、この配線基板26上に3以上の複数（この実施の形態では4以上の偶数、たとえば4）の各組27～30が形成される。1つの組27は、一对の電極27a、27bが相互に隣接してかつ間隔をあけて配置される。また同様にして1つの組28は、一对の電極28a、28bが相互に隣接して間隔をあけて配置され、他の組29、30もまた同様な構成となっている。

【0077】

これらの組27～30は、仮想上の点対称の形状を有する閉ループ31上に対称点42のまわりに周方向に等間隔に、たとえばこの実施の形態では90度ずつ間隔をあけて配置される。閉ループ31は、この実施の形態では真円である。各組27～30の前記各電極は、銅、アルミニウム、カーボンおよびその他の導電性材料から成つてもよい。電極の対を成す各組27、28は、点対称に配置され、また各組29、30は点対称に配置される。

【0078】

感圧部材32は、単一枚であって、すべての組27～30の電極にわたって配置され、操作者の指などの手の操作による厚み方向（図3および図5の上下方向）の押圧力によって、たとえば1つの組27の対を成す電極27a，27b間の電気抵抗が変化する弾発力を有し、導電性である。他の1つの組28の対を成す電極28a，28b間で押圧される感圧部材32の電気抵抗が変化し、このことは残余の組29，30でも同様である。感圧部材32は、感圧導電性ゴムなどのグラファイトと導電性ゴムとの組成物で構成される。感圧部材32は中央の孔33を有し、前記閉ループ31に沿う環状板である。

【0079】

操作部材35は、剛性のたとえば合成樹脂材料から成り、感圧部材32の厚み方向の電極の組27～30とは反対側（図3の上方）の表面に配置される周辺部36を有し、さらに感圧部材32の中央孔33を挿通して配線基板26上に指示される支持突起37を有する。周辺部36の感圧部材32側の表面は、操作部材35の軸線38から図3の左右に遠去かるにつれて、その軸線38方向（図3の上下方向）に支持突起37から遠去かるように上方に傾斜した押圧面39である。

【0080】

この押圧面39と感圧部材32との間には、弾発力を有する緩衝材40が介在される。緩衝材40は、弾発力を有するたとえばスチレン系熱可塑性エラストマなどの弾性と抗張力とを有する電気絶縁性合成樹脂または合成ゴムなどから成る。この緩衝材40は、感圧部材32上に各組27～30毎に個別的に設けられ、押圧力が作用されていない自然状態では、半径方向外方になるにつれて厚みが増大する楔状の断面形状を有する。すなわち緩衝材40は、各組27～30の直上で、感圧部材32上に個別的に、合計4個配置される。この緩衝材40は、感圧部材32の中央孔33から半径方向外方になるにつれて、押圧力が作用されていない自然状態では、その厚みが大きくなるように形成される。図4では、理解を容易にするために、感圧部材32と緩衝材40とに、斜線を付して示す。

【0081】

操作部材35の周辺部36には、外向きフランジ41が形成される。この外向

きフランジ41は、入力操作装置9のハウジング22に形成された挿通孔43の図3における下面である内面に当接して押し下げられている。操作部材35の操作部44は、挿通孔43からハウジング22の外方に露出して図3の上方に部分的に突出する。

【0082】

図6は、本考案の実施の他の形態の第1入力操作手段17の簡略化した断面図である。剛性の電気絶縁性材料から成る操作部材35はたとえば円板状であり、また感圧部材32は単一枚の円板状であり、その他の構成は前述の図3～図5に関連して説明した実施の形態と同様であり、対応する部分には同一の参照符を付す。この実施の形態では、操作部材45には、前述の図3に示される支持突起37は形成されていないけれども、その押圧操作される位置に対応した各組27～30の感圧部材32による電気抵抗が変化される。

【0083】

図7は、配線基板26上に形成された各組27～30の電極27a, 27b; 28a, 28b; …を示す平面図である。電極27a, 27bは、楕形に形成され、その他の組28～30に関しても同様である。電極27a, 27bは、前述の図4に示されるように閉ループ31の半径方向に延びて配置されていてもよいけれども、図7に示されるように閉ループ31の周方向に延びて配置されていてもよい。

【0084】

図8は、電極の各組27～30の接続状態を示す電気回路図である。点対称で配置された各組27, 28の電極27a, 27b; 28a, 28bは、ライン51によって感圧部材32を介する直列回路52が形成される。この直列回路52の一方端は、直流電源の一方端子から電圧 V_{cc} が与えられ、他方端は、共通電位に接地される。また同様にして点対称に配置された各組29, 30の電極も、感圧部材32を介してライン53によって直列回路56が形成され、その一方端は、直流電源の一方端子に接続されて電圧 V_{cc} が接続され、他方端は共通電位に接地される。これらの各組27～30の感圧部材32は、押圧力によって電気抵抗が変化し、図8では可変抵抗の記号47～50でそれぞれ示す。

【0085】

第1入力操作手段17において、押圧操作位置の全方向を表すために、参照符47は、右キーとして働き、また参照符48は左キーとして働き、参照符49は上キーとして働き、参照符50は下キーとして働く。ライン51, 53からの分圧電圧は、出力端子54, 55からそれぞれ導出される。1つの組27の一对の電極27a, 27bが共通の配線基板26に形成されていることによって、構成が簡略化され、またその他の組28～30に関しても同様である。

【0086】

図9は、右キー47と左キー48とに関連する図8に示される電気回路の一部を書直した電気回路図である。出力端子54から得られる分圧電圧V0は、右キー47の抵抗値をR1とし、左キー48の電気抵抗をR2とするとき、式1で示される。

【0087】

$$V0 = R2 \cdot Vcc / (R1 + R2) \quad \dots (1)$$

操作部材35の軸線38からずれた操作部44を押圧すると、緩衝部材40を介して感圧部材32に圧力が加わり、その押圧力に対応して感圧部材32のたとえば1つの組27における電極27a, 27b間の電気抵抗が変化する。これによって出力端子54の分圧電圧V0が押圧力に応じて変化する。感圧部材32の圧力に対して得られる電極27a, 27b間の電気抵抗値は数10kΩから数100Ωである。

【0088】

たとえば直流電源の電圧Vcc=3V、押圧力が零であるとき、感圧部材32による電極27a, 27b間の電気抵抗が30kΩであり、対を成す組28の左キー48を押圧してその電極28a, 28b間の電気抵抗が300Ωであるとすれば、出力電圧V0=約0.003Vとなる。右キー47および左キー48の押圧力がいずれも零であるとき、出力端子54の電圧V0は、1.5Vとなる。したがって電圧V0の変化量は約1.5Vとなり、このような値は、実務上、増幅器を必要とすることなく、増幅することなしに処理手段16において小さいSN比で使用することができるに十分な値の範囲である。

【 0 0 8 9 】

図 1 0 は、 1 つの組 2 7 における感圧部材 3 2 による電極 2 7 a , 2 7 b 間の電気抵抗を、操作部材 3 5 による押圧力に対応した特性を示すグラフである。感圧部材 3 2 の製造時のロットに応じて、ライン 5 7 ~ 5 9 の各種の特性が得られる。これらのライン 5 7 ~ 5 9 によれば、感圧部材 3 2 の押圧力が予め定める値 P_1 未満の範囲 A 1 では、押圧力に応じて電気抵抗が対数的な関数で急激に変化し、その押圧力 P_1 を超える範囲 B 1 では、圧力の変化に対応した電気抵抗の変化が緩やかである。

【 0 0 9 0 】

本考案の考え方に従えば、前述の図 3 において説明した操作部材 3 5 の外向きフランジ 4 1 がハウジング 2 2 によって図 3 の下方に押下げられ、感圧部材 3 2 には、図 1 0 の予め定める圧力 P_1 が予め作用して常に圧縮状態とされる。ハウジング 2 2 は、操作部材 3 5 の外向きフランジ 4 1、したがって緩衝部材 4 0 を介して感圧部材 3 2 を予め圧縮させるように感圧部材 3 2 の弾発力に抗する変位を制限する働きをし、したがってこのハウジング 2 2 は、前述の請求項 1 1 の変位制限手段の働きをする。したがって操作部材 3 5 の操作部 4 4 を押圧操作することによって、この圧力 P_1 を超える範囲 B 1 において電極 2 7 a , 2 7 b 間の電気抵抗が変化し、したがってその押圧力の変化に対応して緩やかに電気抵抗が変化する右キー 4 7 が達成されることになる。このことはその他の各組 2 8 ~ 3 0 に関しても同様である。

【 0 0 9 1 】

感圧部材 3 2 は、前述の図 1 0 のライン 5 7 ~ 5 9 に示されるように、生産ロットによってかなりの固体差がある。本考案の実施の形態では、この感圧部材 3 2 を、各組 2 7 ~ 3 0 毎のキー 4 7 ~ 5 0 毎に単独でそれぞれ使用するのではなく、これらのキー 4 7 ~ 5 0 に共通の単一枚の感圧部材 3 2 を用いる。これによって各キー 4 7 ~ 5 0 の各位置での感圧部材 3 2 毎のばらつきに起因した固体差は同じ割合で発生することになる。この固体差が同じ割合である単一枚の感圧部材 3 2 の任意の 2 カ所、たとえばこの実施の一形態では、点対称な組 2 7 , 2 8 ; 2 9 , 3 0 に、したがって各キー 4 7 , 4 8 ; 4 9 , 5 0 に、分圧抵抗として

用いることによって、これらの直列回路を構成する2カ所の電気抵抗も同じ割合で変化することになり、前述の式1に示されるように、出力される分圧電圧 V_0 は、感圧部材32の固体差の影響を受けることはない。すなわち式1において、ロット毎に感圧部材32の特性の固体差が存在しても、分圧電圧 V_0 は、電気抵抗の比 $R_2 / (R_1 + R_2)$ で決定されるので、その固体差のばらつきによる分圧電圧 V_0 のばらつきが生じることはなく、しかも圧力の値に対応して分圧電圧 V_0 がばらつくことはない。

【0092】

第1入力操作手段7において、点対称の位置に配置される各組27、28に対応する右キー47と左キー48とは同時に押圧されることはなく、また同様に上キー49と下キー50とが同時に押圧されることはない。したがってたとえば上キー49が押圧されているときには、下キー50の位置に対応する感圧部材32による電極30の電気抵抗は、分圧電圧を得るためのいわばダミーの抵抗体として働く。また同様に右キー47が押圧されているとき、左キー48の電気抵抗を得る感圧部材は、ダミーの抵抗体として働く。このようにして第1入力操作手段17では、各組27～30に対応するキー47～50毎の分圧電圧を得るために、後述の図31～図33に示される個別の固定抵抗123を設ける必要がなく、また図34～図36における電極126a、126bの組126と細長い感圧部材32が必要でなくなり、感圧部材32を小さくすることができ、このようにして構成の簡略化を図ることができるという利点がある。

【0093】

第2入力操作手段18、19もまた、第1入力操作手段17の各キー47～50と同様な構成を有し、単独キーの構成を備える。この構成では、たとえば第2入力操作手段18において、前述の組27と同様な一対の電極27a、27bが設けられ、これらの電極27a、27bにわたって感圧部材32が配置され、さらに分圧電圧 V_0 を得るために、これらの電極27a、27bに直列に、ダミーの抵抗を得るために、同様な構成を有する一対の電極を設けて同一の感圧部材を延在して配置し、あるいはまたダミーの固定抵抗を接続し、こうして直列回路を形成する。第2入力操作手段18、19は単独スイッチであって、その他の構成

は、上述の第1入力操作手段17の構成に類似する。

【0094】

図3～図10に関連して述べた第1および第2入力操作手段17；18，19の構成は簡略化されており、小形化が可能であり、生産性が優れており、安価に実現することができるとともに、さらに上述のように製品毎の特性のばらつきがなくなり、しかも出力分圧電圧は増幅器を必要としない程度に、大きい。

【0095】

出力端子54，55からの分圧電圧は、処理手段16におけるアナログ／デジタル変換器23においてデジタル値に変換され、図11に示されるライン61の特性を有する。この図11のライン61および前述の図10のライン57～59は、感圧部材32が押圧力の対数的な変化をした電気抵抗を導出することを示す。図11において押圧力の変化量 $\Delta P1$ ， $\Delta P2$ ， $\Delta P3$ を一定としたときにおけるたとえば1つの組27における電極27a，27bの電気抵抗の変化量 $\Delta R1$ ， $\Delta R2$ ， $\Delta R3$ は、

$$\Delta R1 > \Delta R2 > \Delta R3 \quad \dots (2)$$

の関係がある。

【0096】

図11の感圧部材32に依存したアナログ／デジタル変換されたデジタル値のライン61を、中央処理回路24は演算処理し、押圧力の1次関数の値となるデジタル値の特性を示すライン62となるように変換する。本考案の実施の他の形態では、アナログ／デジタル変換器23の出力をそのまま他の演算処理のために用いるようにしてもよい。中央処理回路24は、ライン61の特性からライン62で示される特性の演算処理をするために、そのライン61のデジタル値に対応したライン62のデジタル値を表すテーブルをメモリ63のレジスタに予めストアして、アナログ／デジタル変換器23の出力に応答してそのストア内容を読み出すようにしてもよく、本考案の実施の他の形態では、ライン61で示されるデジタル値を予め定める演算式に代入して、ライン62で示される特性を有するデジタル値を出力するようにしてもよい。

【0097】

図12は、処理手段16における中央処理回路24の動作を説明するためのフローチャートである。中央処理回路24は、ゲーム機本体6のマイクロコンピュータ15からシリアル入力／出力インタフェース65から可撓線8を介して、ゲームの演算処理に必要とするデータ信号を要求する指示信号を受信するとともに、画面の同期信号を受信する。ステップS1からステップS2に移り、その指示信号が表す要求内容の判断を行い、たとえばゲーム内のキャラクタ12または背景13の一連の動作、移動量および加速量などの判断を行う。ステップS3a～S3cでは、第1～第3入力操作手段17；18，19；20，21からの第1～第3検出信号を受信してデータの取込みを行い、ステップS4a～S4cでは、それらの第1～第3検出信号の組合わせである相関を演算処理する。これによってステップS5aでは、後述の図13～図15のように、キャラクタ12または背景13の一連の動作を行うレベル弁別をして予め定める複数の各範囲のうちで属する前記範囲を判断する。また同様にステップS5bでは、キャラクタ12または背景13の移動量に関するレベル弁別による範囲を判断し、さらにまた同様にステップS5cでは、加速度に関するレベル弁別をして範囲を判断する。前述のステップS3a～3cにおけるデータの取込みは、第1および第2検出信号のアナログ／デジタル変換器23からのデジタル値をそのまま用いてもよいけれども、前述の図11に関連して述べたようにたとえば押圧力に対応した1次関数の値に演算処理したデジタル値を用いて後続の演算処理を行うようにしてもよい。

【0098】

先行技術では、入力操作装置で得られたアナログ式検出信号を2進数にアナログ／デジタル変換したデジタル値を、そのままゲーム機本体のマイクロコンピュータに与えてその入力操作装置から与えられた2進数のデジタル値を、たとえば加速量、移動量およびゲーム内のキャラクタなどの一連の動作を表す情報に変換する演算処理を行っていたけれども、本考案の実施の形態では、ゲーム本体6のマイクロコンピュータ15から、ゲーム機本体6で必要な、すなわち入力操作装置9において行うべき演算処理を表す指示信号を、入力操作装置9の処理手段16に与え、この処理手段16の中央処理回路24が、この指示信号の内容に合致

したデータ信号を生成するので、本考案におけるゲーム機本体6のマイクロコンピュータ15の情報処理の負担を軽減することができ、その分、マイクロコンピュータ15は、他の演算処理のために動作することができ、こうしてゲームのスピードアップを図ることができる。

【0099】

図12におけるステップS6では、ステップS5a～S5cで得られる前記判断された範囲に対応して演算処理されたデータ信号は、次のステップS6においてゲーム機本体6のマイクロコンピュータ15との通信フォーマットに適合したデータ列で、出力レジスタ64にストアされて格納される。

【0100】

ステップS7において、ゲーム機本体6のマイクロコンピュータ15から、データ信号の要求を表す指示信号を受信すると、次のステップS8において、そのデータ信号は、可撓線8を介してゲーム機本体6に導出される。ステップS9においてゲーム機本体6からゲームの終了を表す信号を受信されると、次にステップS10で一連の動作を終了する。

【0101】

図13は、入力操作装置9の操作による表示手段10における画面11の表示態様を説明するための図である。図13(1)は、第1入力操作手段17の平面図である。右キー47を押圧操作することによって、図13(2)に示されるように画面11ではキャラクタ12が右方の移動方向164に移動する。先行技術では、入力操作装置における右方向への押ボタンを押圧し続けると、キャラクタ12は画面11内で一定の速度で右方向164に移動する構成となっている。

【0102】

このような本考案の実施の一形態および従来技術に関連する動作を、図14を参照してさらに説明する。第1入力操作手段17におけるキー47～50を押圧操作しない状態は図14(1)に示されており、このとき画面11内でキャラクタ12は停止したままである。先行技術では、右方向への押ボタンを操作すると、図14(2)のようにキャラクタ12は、最初の位置66から位置67～69を経てその操作している時間に対応する時間だけ、一定の速度で移動し続ける。

これに対して本考案の実施の形態では、図14(1)、図14(3)～図14(6)のように第1入力操作手段17の第1検出信号を、アナログ／デジタル変換器23において、たとえば分解能7ビットでデジタル値に変換することによって、そのデジタル値は、感圧部材32の抵抗値に対応したアナログ式第1検出信号に応じて、0～127までのデジタル値を得ることができる。このデジタル値を、たとえば0である第1範囲、1～32の第2範囲、33～64の第3範囲、65～96の第4範囲および97～127の第5範囲に分割し、その第1入力操作手段17の押圧力に対応してレベル弁別して範囲を判断し、これに応じて図14(1)、図14(3)～図14(6)の動作が行われる。入力操作手段17が操作されていないときには、図14(1)の状態である。

【0103】

図15は、入力操作装置9における処理手段16の動作を説明するための波形図である。ゲーム機本体6からは可撓線8を介して図15(1)に示される同期信号が与えられ、処理手段16は、この同期信号に同期してその第1入力操作手段17の押圧力に対応したデータ信号を、図15(2)～図15(6)に示されるように導出する。図15(2)は、第1入力操作手段17が押圧操作されない状態におけるデータ信号の波形を示している。

【0104】

第1入力操作手段17が押圧操作され、その前記デジタル値が、1～32の前記第1範囲にあるとき、データ信号は、図15(3)のように画面の予め定める複数(この実施の形態では4)のフレーム数を単位として、それらの複数のフレームのうちの前記判断された範囲に対応した1または複数のフレームで一方の論理値、すなわちローレベルであり、残余のフレーム(フレームの零を含む)では、他方の論理値であるハイレベルであるデータ信号を時系列的に導出する。この第1範囲が判断されたとき、一対のフレームではローレベルであり、残余の3フレームではハイレベルである。このローレベルである1つのフレームにおいて、図14(3)に示されるようにキャラクタ12は、元の位置66から1フレーム分に対応した予め定める一定の距離だけ移動する。こうして押圧力が第1範囲であつたたとえば1～100g未満であるとき、キャラクタ12の移動速度が低い

。第1操作手段17を、たとえば100g以上、200g未満であって、デジタル値が33～64の第2範囲であるとき、図15(4)に示されるようにデータ信号は、2つのフレームでローレベルであり、残余の2つのフレームでハイレベルである信号が導出され、これによって図14(4)に示されるように、ローレベルであるフレームの期間において、キャラクタ12が位置67を経て移動し、したがって移動速度が図14(3)および図15(3)に比べて高い速度になる。

【0105】

第1入力操作手段17を、たとえば300g以上、400g未満の押圧力で操作すると、その押圧力に対応するデジタル値は、65～96の第3範囲であり、このときデータ信号は図15(5)に示されるように3つのフレームでローレベルであり、残余の1つのフレームでハイレベルとなり、図14(5)に示されるようにキャラクタ12は、元の位置66が位置67、68を経て移動する。さらに第1入力操作手段17を、400g以上の大きい押圧力で操作してデジタル値が97～127の第5範囲であると判断されると、図15(6)に示されるように1単位である4つのすべてのフレームにわたりローレベルであるデータ信号が導出され、これによって各フレーム毎にキャラクタ12は図14(6)に示されるように元の位置66から位置67、68、69を経て移動し、高速度となる。このようにして第1入力操作手段17の押圧力に応じて、第2範囲～第5範囲では、4フレームに1回、2回、3回および全フレームにわたり、右キー47に対応するデータ信号が時系列的に時間経過に伴って論理値が変化するデータ信号が導出されることになる。このことは他のキー48～50に関しても同様である。こうして図14(2)に示されるように従来の入力操作装置におけるデジタル式押ボタンを操作したときに比べて、本考案では押圧力を制御して、キャラクタ12の移動速度を小さくして調整することができるようになり、ゲームの興味を増すことができる。

【0106】

第1および第2入力操作手段17；18、19の押圧力に依存するレベルを有する第1および第2検出信号を、アナログ／デジタル変換器23でデジタル値に

変換した後、そのデジタル値を、予め定める値でレベル弁別することによって、オン／オフの2値の2つの範囲に判断して、デジタル式押ボタンとして使用することもまた、可能である。

【0107】

さらに第1および第2入力操作手段17; 18, 19を操作することによって、たとえば図16(1)に示されるように、画面11におけるキャラクタ12を、曲線の滑らかな軌跡71をたどるようにして移動させることもまた可能である。先行技術の図16(2)に示されるように、画面11内のキャラクタ12は、方向を指示するデジタル式の押ボタンを操作し、曲線上の軌跡72の組合せによって、すなわち右方向、左方向、上方向および下方向のみの押ボタンを個別的にまたは同時に2つ押圧操作することによって、上下左右および斜め45度のみ移動した曲線上の軌跡72をたどることしかできない。本考案は、この問題を解決し、上述の図16(1)の滑らかな軌跡71をキャラクタ12がたどることが可能になる。

【0108】

図17は、図16(1)に示される滑らかな軌跡71をキャラクタ12がたどるための動作を説明するための図である。第1入力操作手段17を図17(1)に示されるようにキー49からキー47に位置73から74にわたり矢符75で示されるように滑らかに押す位置を移動するとき、電極の各組27~30の押圧力に対応した電気抵抗を表す検出信号のレベルが変化する。図17(2)に示されるように、キー49による上向きのベクトルA2とキー47による右向きのベクトルB2にそれぞれ対応する各組29, 27からの検出信号のレベルによって、これらのベクトルA2, B2の合成によれば、斜めのベクトルC2を得ることができる。

【0109】

$$A2 + B2 = C2 \quad \dots (3)$$

したがってキー49, 47が同時に押圧操作されると、キャラクタ12の軌跡は、ベクトルC2に対応して斜めになる。このベクトルC2の傾きは、上向きのベクトルA2と右向きのベクトルB2との縦横のベクトル比によって変化する。

したがってその合成ベクトルC2の傾きを、キー49、47の押圧力に応じて滑らかに表現することができるのである。したがって図17(3)に示されるようにキャラクタ12の実際の軌跡76は、縦横12または128などの分割の単位距離毎に、理想とする所望の軌跡77にほぼ一致して得ることができる。

【0110】

これに対して先行技術では、デジタル式押ボタンを用いているので、実際のキャラクタの軌跡78は、理想とする所望の軌跡77から大きくずれてしまい、上方向および右方向の各軌跡96、97と、斜め45度の軌跡98との組合せになる。こうして本考案では、理想の軌跡77にごく近似した実際の軌跡76をキャラクタ12がたどって移動させることができるようになる。

【0111】

図18は、本考案の実施の他の形態において3次元演算手法によってシューティングゲームを行うときの画面11を示す。戦闘機85が上81、下82、左83および右84に移動し、さらに画面11の奥および手前で移動させることができ、このために第1入力操作手段17が操作され、さらに上述の3次元演算手法によって奥行きの視点の移動を行うことができ、さらに第1または第2入力操作手段17;18、19の押圧力の強さによって、戦闘機85の加速度を滑らかに変化させることができる。

【0112】

図19は、本考案の実施の他の形態における3次元演算手法を用いてレーシングゲームを行うときにおける画面11を示す。第1入力操作手段17の操作によってキャラクタである自動車86のハンドルの切り角すなわち操舵角を滑らかに変化して移動方向87を制御することができる。さらに第2入力操作手段18、19を、アクセルペダルおよびブレーキペダルに個別的に対応し、自動車86の加速度を操作者の自然な感覚に合わせて移動させることができる。

【0113】

図20は、本考案の実施のさらに他の形態におけるキャラクタ12の表示態様の変化を説明するための図である。図20(1)において第2入力操作手段18を押圧操作することによって、Z軸+方向に加速度aで移動するデータ信号が発

生され、第3入力操作手段20を操作することによって制動動作によって減速されるデータ信号が発生されるものとする。立方体状のキャラクタ12が、第2入力操作手段18の押圧操作によってZ軸+方向に加速度aで移動しているとき、その第2入力操作手段18を押圧操作したままでデジタル式の第3入力操作手段20を、図20(2)に示されるようにさらに押したとすれば、中央処理回路24では、これらの第2および第3入力操作手段18、20の第2および第3検出信号に応答してその相関が求められ、キャラクタ12の移動方向が、Z軸-方向となるデータ信号が作成されることになる。

【0114】

図21は、本考案の実施のさらに他の形態の表示態様の変化を説明するための図である。ゲームがボクシングなどの格闘ゲームであるとき、第1入力操作手段17の操作によってキャラクタ88の全方向にわたる角度を調整制御することができ、またその押圧力によって方向の移動速度を調整することができる。さらに第2入力操作手段18、19の押圧力に依存して、キャラクタ88のパンチの強さを調整し、それに応じてキャラクタ89が、そのパンチの強さに応じて、キャラクタ89の部分、たとえば体幹が参照符90で示されるように移動し、その移動量に応じてパンチの強さを表すことができ、したがってキャラクタ89の変化の時間変化率を、第2入力操作手段18、19の押圧力で調整することが可能となる。

【0115】

図22は、本考案の実施のさらに他の形態におけるたとえば格闘ゲームにおける画面11の表示態様の変化を説明するための図である。その格闘ゲームにおいて、人間の形状をしたキャラクタ91の一部分である下肢の足92のように弱い蹴りを行い、図22(2)で示されるように足93がさらに上昇変位して中程度の蹴りを行い、さらに図22(3)のように足94が上昇変位して強い蹴りを行うときには、第1または第2入力操作手段17; 18, 19の押圧力を変化し、押圧力の小さい状態から大きい状態に、弱い蹴りから強い蹴りを対応させる。これによって操作者の無意識の感覚に応じた蹴りの程度を表示して攻撃を行わせることができ、操作者の意思に対応させることができる。

【0116】

図23は入力操作装置9における中央処理回路24の動作を説明するための本考案の実施の他の形態のフローチャートであり、図24はこの図23の動作が行われる際における第1または第2入力操作手段17; 18, 19から得られる第1または第2検出信号の波形図である。図24に示される第1または第2検出信号は、アナログ/デジタル変換器23によって変換されたデジタル値に対応し、またはそのデジタル値が図11に関連して前述した演算処理されたデジタル値に対応する。たとえば第1入力操作手段17における操作部材35のキー47において、叩くように押圧操作されたとき、第1検出信号のレベルはライン101のように変化し、これに対して、ゆっくりと押圧操作されたときには、ライン102の波形が得られる。

【0117】

図23のステップU1において、第1入力操作手段17の操作部材35のキー47が叩くように押圧操作されたときを想定する。ステップU2では、中央処理回路24は、出力端子54からの分圧電圧が予め設定された割込み信号要求レベルである第1弁別レベル V_1 以上になった時刻 t_1 で、割込み動作を行う。ステップU3では、この第1検出信号が、第1弁別レベル V_1 以上になってから予め定める第1の時間 W_1 （たとえば1ms）経過する時刻 t_2 まで待ち、その後、ステップU4では、出力端子54に出力される分圧電圧 V_{01} を取込む。次のステップU5では、分圧電圧 V_{01} を第2弁別レベル V_{t1} でレベル弁別し、分圧電圧 V_{01} が、 $V_{01} \geq V_{t1}$ であれば、ステップU6において、操作部材35がキー47において叩くように押圧操作されたものと判断し、その操作に対応してゲーム機本体6が所望するデータ信号を、演算処理によって生成して導出する。第2弁別レベル V_{t1} は、第1弁別レベル V_1 を超える値に定められる。

【0118】

第1入力操作手段17における操作部材35がキー47においてゆっくりと押圧操作されたときにも、図23のステップU1～U5がほぼ同様に実行される。出力端子54から出力される分圧電圧が割込み信号要求レベルである第1弁別レベル V_1 の時刻 t_{1a} から予め定める第1の時間 W_1 経過した時刻 t_{2a} にお

る分圧電圧 V_{02} を第2弁別レベル V_{t1} でレベル弁別し、ステップU5で、 $V_{02} < V_{t1}$ であることが判断されると、ステップU7に移り、操作部材35のキー47がゆっくりと押圧操作されたものと判断し、通常のアナログ処理を行い、あるいはゲーム機本体6が所望するデータ信号を、演算処理によって生成して導出する。

【0119】

図25は、たとえば第1入力操作手段17における操作部材35のキー47を押圧操作した状態から手指を離れたときにおける出力端子54から得られる分圧電圧である第1検出信号の波形図である。この分圧電圧は、アナログ/デジタル変換器23から得られるデジタル値に対応し、または図11に関連して前述した演算処理後の信号に対応する。キー47における操作部材35から手の指を瞬時的に急に離したときには、ライン103の波形が得られ、これに対してゆっくりと離したときにはライン104の波形が得られる。

【0120】

ライン103が得られるとき、中央処理回路24は、図23のステップU1からステップU2に移り、分圧電圧を、中央処理回路24の割込み信号要求レベルである第3弁別レベル V_2 以下になった時刻 t_3 を検出し、その時刻 t_3 から予め定める第2の時間 W_2 （たとえば1ms）経過した時刻 t_4 における出力端子54の分圧電圧 V_{04} を、ステップU4で取込む。ステップU5では、分圧電圧 V_{04} を第4弁別レベル V_{t2} でレベル弁別し、 $V_{04} \leq V_{t2}$ であれば、ステップU6で、操作部材35がキー47で急に手の指が離されたものと判断し、これによってゲーム機本体6が所望するデータ信号を、演算処理して生成し導出する。

【0121】

ライン104が得られるように操作部材35から手の指がゆっくりと離されたとき、その分圧電圧が割込み信号要求レベル V_2 以下になった時刻 t_{3a} から予め定める第2の時間 W_2 経過後の時刻 t_{4a} の分圧電圧 V_{03} を同様にしてステップU4で得る。ステップU5で、 $V_{03} > V_{t2}$ であることが判断されると、ステップU7において操作部材35から手の指がゆっくりと離されたものと判断

し、通常のアナログ処理またはゲーム機本体が所望するデータ信号を、演算処理によって生成して導出する。第4弁別レベル V_{t2} は、第3弁別レベル V_2 未満に定められる。上述の説明は、第1入力操作手段17のキー47に関連して行われたけれども、その他のキー48～50および第2入力操作手段18、19に関してもまた同様である。

【0122】

図26は、前述の図23および図24に関連する本考案の実施の一形態において可撓線8に処理手段16から導出されるデータ信号のデータ列を示す。図26

(1)のデータ列は、第1入力操作手段17におけるキー47～50および第2入力操作手段18、19の操作によって得られる分圧電圧が、割込み信号要求レベル V_1 以上であって押圧操作されたか否かを表す。データ列の各ビット位置は、これらのキー47～50および第2入力操作手段18、19に対応し、押圧操作されていれば論理「1」が発生され、押圧操作されていなければ論理「0」が導出される。図26(1)において第2入力操作手段18、19による論理値は、参照符A、Bのビット位置に示されており、さらに追加的なアナログ式入力操作手段が設けられ、また第3入力操作手段20、21などに対応してビット位置C～Iが設けられる。

【0123】

図26(1)のデータ列に引続いて、さらに図26(2)に示されるもう1つのデータ列から成るデータ信号が、中央処理回路24から導出される。この図26(2)に示されるデータ列では、各ビット位置は、前述の図26(1)のデータ列のビット位置と同一であり、特に第1入力操作手段17における操作部材35が各キー47～50において図24における第2弁別レベル V_{t1} 以上であるか、または第2弁別レベル V_{t1} 未満であるかに応じて、論理「1」および論理「0」がそれぞれ生成される。このことは第2入力操作手段18、19に関しても同様であり、さらにその他の追加的なアナログ式入力操作手段に関しても同様である。したがって図26(1)および図26(2)の各データ列から成るデータ信号を、処理手段16からゲーム機本体6に同期信号に同期して各フレーム毎に導出することによって、ゲーム機本体6におけるゲームの演算処理のために用

いられる。さらにまた図25に関連して述べたデータ信号も、図26に示されるデータ列と同様なデータ列でゲーム機本体6に与えられる。

【0124】

図27は、ゲーム機本体6における図23～図26に関連して前述した入力操作によってゲームの演算処理がマイクロコンピュータ15で行われて画面11に表示される状態を示す図である。マイクロコンピュータ15は、たとえば第1入力操作手段17における操作部材35のキー47が図24のライン102のようにゆつくりといわば弱いタッチで、したがって押圧力の小さい時間変化率で押圧操作されたとき、画面11のキャラクタ12は右方に参照符105、106で示されるように一定速度で右方向に転がって移動する。

【0125】

操作部材35のキー47をいわば強いタッチで、したがって大きな時間変化率で前述の図24のライン101に示されるように叩くようにして押圧操作したときには、図27(2)に示されるようにキャラクタ12は、その画面11における障害物107を越えてその障害物107を避けてジャンプしながら右方向に転がって移動する。このようにして第1および第2入力操作手段17;18,19の押圧操作速度を変えることによって、キャラクタ12または背景の表示態様の变化を多種類、行うことができる。

【0126】

図28は、本考案の実施の他の各形態の第1入力操作手段17の簡略化した平面図である。前述の操作部材35,45に代えて、図28(1)に示される操作部材111は、十字状に形成されてもよく、図28(2)の操作部材112のように正方形に形成されてもよく、あるいはまた図28(3)の操作部材113のように正八角形に形成されてもよく、このような操作部材35,45,111,112,113は、点対称な形状であってもよいけれども、その他の形状であってもよい。

【0127】

図29は、本考案の実施の他の形態における第1入力操作手段17の電極の各組114～117を示す平面図である。電極の各組114～117は、真円の閉

ループ上で周方向に90度の間隔をあけて配置して形成されることが、前述の図4に関連して述べた実施の形態と同様であるけれども、その図4の実施の形態に比べて周方向に45度ずれており、たとえば右方向の検出のために2つの組114, 115が用いられ、またたとえば上方向の検出のために電極の組114, 117がもういられる。このような構成もまた、本考案に含まれる。

【0128】

図30は、本考案の実施のさらに他の形態の第1入力操作手段17の簡略化した縦断面図である。碗状の操作部材118は、軸線38を中心とする周方向に設けられた円板状または球などの複数のローラ119によって支持される。ローラ119の回転量および回転角度は、エンコーダによって検出信号が導出され、こうして操作部材118の操作位置の全方向を検出することができる。さらに操作部材118の軸線38に平行な押圧力などもまた、押圧力検出手段120によって検出することができる。

【0129】

本考案の実施の他の形態では、操作部材35の支持突起37によって押圧力を検出する構成を、基板26上に配置してもよく、その構成はたとえば感圧部材32と電極27a, 27bを用いる構成と同様であってもよい。

【0130】

図31は第2入力操作手段18の断面図であり、図32はその第2入力操作手段18の簡略化した平面図であり、図33は図31および図32に示される第2入力操作手段18の接続状態を示す電気回路図である。これらの図面において、前述の第1入力操作手段17の対応する構成要素には、同一の参照符を付す。配線基板26上に形成された組122の一对の電極122a, 122b上にわたって感圧部材32が配置され、その感圧部材32上に緩衝材40を介して剛性の操作部材35が配置され、その外向きフランジ41はハウジング22によって押さえられて感圧部材32は予め圧縮された状態となっている。注目すべきは、この考案の実施の形態では、配線基板26には固定抵抗123が設けられ、この固定抵抗123は、配線基板26上に形成されたライン124を介して電極122bに接続されて直列回路が形成される。この直列回路は、固定抵抗123において

直流電源の一方端子Vccに接続され、電極122aは共通電位に接地される。ライン124は出力端子125に接続され、第2検出信号が導出される。この出力端子125からの第2検出信号のレベルは、操作部材35による感圧部材32の押圧力に依存した一对の電極122a, 122b間の電気抵抗と固定抵抗123とによる分圧電圧である。

【0131】

図34は本考案の実施の他の形態における第2入力操作手段18の断面図であり、図35は図34に示される第2入力操作手段18の簡略化した平面図であり、図36は図34および図35に示される第2入力操作手段18の接続状態を説明する電気回路図である。この実施の形態もまた、前述の第1入力操作手段17および前述の図31～図33に示される第2入力操作手段18の構成に類似し、対応する部分には同一の参照符を付す。注目すべきはこの実施の形態では、配線基板26には、組122のほかに、もう1つの組126の一对の電極126a, 126bが形成され、さらに感圧部材32は、これらの各組122, 126の各電極122a, 122b; 126a, 126bにわたって配置される。前記組122の直上で、感圧部材32は操作部材35から緩衝材40を介して押圧操作される。電極122bと電極126aとは、ライン127を介して接続されて直列回路が構成され、この直列回路における電極126bは直流電源の一方の端子Vccに接続され、電極122aは共通電位に接地される。ライン127からの分圧電圧は、出力端子128から第2検出信号として導出される。

【0132】

電極126a, 126b間における感圧部材32の電気抵抗は、出力端子128から分圧電圧を得るためのいわばダミーの固定抵抗としての働きを果たす。前記組126の直上における感圧部材32を、それらの電極126a, 126bに一定の圧力で押圧するための部材を設けてもよい。その他の構成は、上述の実施の形態と同様である。

【0133】

図34～図36に示される実施の形態では、各組122, 126にわたって感圧部材32が共通に設けられ、しかも出力端子128からは各組122, 126

における感圧部材32による電気抵抗による分圧電圧が導出される構成となっており、第1入力操作手段17に関連して前述したのと同様に、感圧部材32の特性に依存して分圧電圧が大きく変化してばらつきが生じることが防がれるという優れた効果が達成される。

【0134】

もう1つの第2入力操作手段19もまた、第2入力操作手段18と同様に構成されてもよい。第1入力操作手段17の各キー47～50もまた、前述の第2入力操作手段18と同様な構成をそれぞれ有していてもよい。さらに第3入力操作手段20、21もまた、第2入力操作手段18、19と同様に構成され、その第2検出信号をアナログ／デジタル変換して得たデジタル値を、1つの弁別レベルで2値化する検出装置を有してもよい。

【0135】

【考案の効果】

請求項2および請求項3、4の本考案によれば、従来ではゲーム機本体に備えられているマイクロコンピュータで演算処理していたキャラクタまたは背景の表示態様の変化、たとえば加速量、移動量およびキャラクタの連の動作情報等を、本考案では入力操作装置に備えられている処理手段で演算処理してデータ信号を生成するようにしたので、ゲーム機本体に備えられているマイクロコンピュータの情報処理の負担が減り、その分、他の演算処理を行うことができるようになり、これによってゲームのいわゆるスピードアップが一層可能になる。

【0136】

さらに請求項2および4の本考案によれば、処理手段は、必要な種類の演算処理を表す指示信号がゲーム機本体から与えられることによって、さらに請求項4では、第1および第2検出信号のレベル弁別をするなどの演算処理を行って、データ信号を導出するようにしたので、その入力操作装置における処理手段の演算処理動作は、必要なだけ行われることになり、無駄な動作がなくなり、その分、必要な演算処理量を多くし、これによってゲーム機本体に備えられているマイクロコンピュータの負担を軽減することが、さらに一層可能になる。

【0137】

さらに本考案によれば、処理手段は、ゲーム機本体の通信フォーマットに適合したデータ列でデータ信号を作成して導出し、すなわちシリアルビットでデータ信号を導出する。

【0138】

請求項1および5の本考案によれば、第1または第2検出信号を得るための第1または第2入力操作手段は、指などの手で操作される押圧力に対応したレベルを有し、これによって操作性が向上されるとともに、構成の小形化を図り、取付場所の取合いの問題を解決しやすくなる。請求項1の検出装置ならびに請求項5における第1および第2入力操作手段では、たとえば後述の感圧部材を指などの手で直接に押圧操作する構成を含むのは勿論、さらにたとえば360度にわたって揺動可能な操作棒によって感圧部材などを押圧操作して第1または第2検出信号を導出する構成などをも含む。

【0139】

この押圧力は、ゲームを楽しむ操作者の興奮の程度が激しくなると、大きくなり、したがって操作者の感覚、フィーリングをそのまま第1および第2検出信号のレベルとして導出することができ、ゲーム機の興味が一層、向上されることになる。先行技術には、このような押圧力を用いる入力操作のための構成は、実現されていない。

【0140】

請求項6の本考案によれば、配線基板上に一对の電極を設け、その上に感圧部材を配置したので、構成が簡略化され、また小形化され、しかも生産性が優れており、安価に実現される。

【0141】

請求項7の本考案によれば、感圧部材は単1枚であり、複数の各組の電極間からの分圧電圧を得るようにしたので、第1または第2入力操作手段の製品毎の特性のばらつきをなくし、固体差の影響を小さく抑えることができるようになる。また分圧電圧を比較的大きくすることができ、増幅器なしで良好なSN比を得ることができる。

【0142】

請求項8の本考案によれば、押圧操作位置の全方向を指示することができる第1入力操作手段では、3以上の複数の各組を成して電極が配置され、製品毎の特性のばらつきをなくし、各組の電極間の電気抵抗に対応する分圧電圧を得て全方向を検出することができる。

【0143】

請求項9、13の本考案によれば、感圧部材には、押圧操作されていない状態でも、一定の圧力を予め加えておき、これによって操作される押圧力によって第1または第2検出信号のレベルが大きく変動することを防ぎ、押圧力に正確に対応した安定したレベルを有する第1または第2検出信号を得ることができるようになり、ゲームを行っているときにおける操作性が向上することになる。

【0144】

請求項10の本考案によれば、電極の各組が配置される仮想上の閉ループは、たとえば真円などの点対称の形状を有しており、点対称の位置にある2組の電極が直列回路を形成し、感圧部材は揺動自在の剛性の操作部材によって操作されるので、押圧操作される位置の全方向を検出することができるのは勿論、点対称の位置にある2組の電極のうち、一方の組が押圧操作されているとき、他方の組に押圧力が作用せず、その圧縮力が作用しない電極にわたる感圧部材の抵抗を、分圧電圧を得るために用いることができ、したがって分圧電圧を得るために別途、固定抵抗を設ける必要がなく、構成の簡略化を図ることができる。

【0145】

請求項11の本考案によれば、剛性の操作部材に形成される支持突起のまわりに揺動可能とされるので、点対称の位置にある2組の電極のうち、押圧操作されない前記他方の組では、押圧力が確実に作用されないようにすることができ、分圧分圧電圧、したがって分圧電圧によって押圧操作位置の方向を正確に検出することができる。しかも操作部材には形成した押圧面が形成されるので、押圧位置では感圧部材が対称点から放射方向に均一な応力が作用することになり、したがって押圧力に対応した安定したレベルを有する第1検出信号を得ることができる。

【0146】

請求項12の本考案によれば、緩衝材40は、閉ループ31の周方向に分断されており、しかも各組27～30の直上に配設されているので、各組27～30の中間の位置に、たとえば組29と組28との間にある操作部材35を押圧操作することによって、その押圧操作された中間の位置を正確に表す第1検出信号を得ることができる。これによってゲームを楽しむ操作者の操作状態を正確に表す第1検出信号を得て、画面内のキャラクタおよび背景の表示態様の変化を行わせることが正確に可能になる。

【0147】

請求項14の本考案によれば、押圧力または操作量などの操作物理量の1次関数の値となるように、第1または第2検出信号のレベルをデジタル値に変換するので、第1または第2入力操作手段の各種の特性に拘わらず、処理手段における演算処理を正確にかつ円滑行うことができるようになり、また演算処理が容易になる。

【0148】

請求項15の本考案によれば、第1または第2検出信号のデジタル値の変化の速度を求めてレベル弁別して複数の範囲を判断するようにしたので、ゲームの興味を向上することができるとともに、比較的ステップ数の多い演算処理を処理手段で行うので、ゲーム機本体におけるマイクロコンピュータの情報処理の負担が増大することはない。

【0149】

請求項16、17の本考案によれば、第1または第2検出信号の正または負の変化の速度を演算して求めることができ、ゲーム機本体におけるマイクロコンピュータなどの負担を軽減することができる。

【0150】

請求項18の本考案によれば、第1または第2検出信号のデジタル変換された値を1つの弁別レベルでレベル弁別することによって、2値信号としてを得ることができ、あるいはまた複数の相互に異なる弁別レベルでレベル弁別することによって、従来のたとえばパンチの強さに応じて個別的に設けられた押釦の数を低減し、しかも多段階の信号を得ることができ、構成の小形化が容易に可能になる

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【0151】

請求項19の本考案によれば、アナログ式の第1および第2検出信号のレベルとデジタル式の2値である第3検出信号との組合わせ相関に対応したデータ信号を作成し、画面のキャラクタまたは背景の表示態様を多種類に変化させることができるようになる。

【0152】

請求項20の本考案によれば、第1または第2検出信号のレベルに対応してデータ信号を時系列的に生成し、これによって画面におけるキャラクタまたは背景の変化の態様を多種類、実現することができ、ゲームの興味を向上することができる。

【0153】

請求項21の本考案によれば、時系列的なデータ信号は、画面の各フレームに同期して導出され、画面におけるキャラクタまたは背景の安定した表示態様の変化を達成することができる。

【0154】

請求項22の本考案によれば、一対の電極間の感圧部材の押圧力に対応した第1または第2検出信号を導出するために、それらの電極が形成された配線基板上に固定抵抗を設け、これによって組立作業を容易にし、構成の小形化を図ることができる。このことは特に操作者が手掌で掴んで操作し、したがって小形化が要求される入力操作装置において重要なことである。

【0155】

本考案の請求項1～14における操作は、たとえば感圧部材を操作者の指などの手で直接に押圧操作するだけでなく、前述の実施の形態における操作部材35を介して押圧操作し、さらに360°にわたり、または一軸線まわりに揺動するスティックまたはレバーなどの操作棒によって感圧部材を押圧操作し、さらには感圧部材を用いる代りに、ばねによってばね力が与えられる被検出部材の操作による変位を電気信号に変換して前記第1および第2検出信号を得る構成などを含む。

【提出日】平成9年3月31日

【手続補正2】

【補正対象書類名】明細書

【補正対象項目名】0014

【補正方法】変更

【補正内容】

【0014】

【課題を解決するための手段】

本考案は、キャラクタまたは背景の表示態様を変化する家庭用ビデオゲーム機用入力操作装置であって、

この入力操作装置は、第1、第2および第3の入力操作手段を有し、

第1の入力操作手段は、操作の位置の全方向を指示するための第1加圧手段を有し、その第1加圧手段による押圧力によって電気的特性が変化するアナログ式の複数の第1検出装置から成り、その第1検出装置から検出された第1検出信号を導出し、

第2の入力操作手段は、直線状の方向を指示する第2加圧手段を有し、その第2加圧手段による押圧力によって電気的特性が変化するアナログ式の第2検出装置から成り、その第2検出装置から検出された第2検出信号を導出し、

第3の入力操作手段は、非操作状態と操作状態とを検出する第3検出装置から成り、その第3検出装置は2値のレベルを導出し、

本件家庭用ビデオゲーム機用入力操作装置は、さらに、

第1、第2および第3の検出信号をインタフェースを介して取得し、キャラクタまたは背景を操作するための一連の動作情報を表すデータ信号を生成する検出信号処理手段と、

ゲーム機本体にデータ信号を導出する通信手段とを有することを特徴とする家庭用ビデオゲーム機用入力操作装置である。

また本発明は、検出信号処理手段は、第1または第2検出信号をアナログ／デジタル変換して取得することを特徴とする。

【手続補正3】**【補正対象書類名】明細書****【補正対象項目名】0024****【補正方法】変更****【補正内容】****【0024】**

さらに、処理手段は、常に多くの演算処理を行っているというのではなく、請求項2、5のように、指示信号の指示する演算処理だけを行い、無駄な演算処理は行わず、これによって演算結果を得る時間を短縮することができる。

【手続補正4】**【補正対象書類名】明細書****【補正対象項目名】0025****【補正方法】変更****【補正内容】****【0025】**

請求項4における処理手段に備えられている演算処理手段というのは、前掲の実用新案登録請求の範囲請求項15～22などの各演算処理を行う構成、またはそのほかの演算処理を行う構成を含む。アナログ／デジタル変換した値を、どの範囲に属するか複数回判断するというのは、前掲の実用新案登録請求の範囲請求項16～18のように、操作された速度を求めるために、時間間隔をあけて2回以上、アナログ／デジタル変換して演算処理を行うことを含む。

【手続補正5】**【補正対象書類名】明細書****【補正対象項目名】0026****【補正方法】変更****【補正内容】****【0026】**

請求項4の処理手段は、ゲーム機本体が所望する演算処理手段を判断し、この所望する演算処理手段というのは、ゲーム機本体のマイクロコンピュータからの

指示信号が指定する演算処理手段であつてもよく、または本件入力操作装置に備えられている操作者によって操作される切換えスイッチなどによってその演算処理手段を切換えて動作させる構成などを含む。

【手続補正6】

【補正対象書類名】明細書

【補正対象項目名】0027

【補正方法】変更

【補正内容】

【0027】

請求項1, 5におけるキャラクタまたは背景の表示態様の変化というのは、そのキャラクタ自体または背景自体の移動などして変化することを含むとともに、キャラクタまたは背景の少なくとも一部分、たとえばキャラクタが人体であるとき、その人体の一部分、たとえば体幹または下肢などが移動などして変化することを含む。

【手続補正7】

【補正対象書類名】明細書

【補正対象項目名】0028

【補正方法】変更

【補正内容】

【0028】

請求項2, 5における指示信号は、命令であるコマンドを表す信号であつてもよく、またはゲーム機本体から請求項1の検出信号処理手段または請求項4, 5の処理手段に与えられる演算処理を実行するプログラムを表す信号であつてもよく、このプログラムに従って前記検出信号処理手段または前記処理手段が演算処理を実行する。

【手続補正8】

【補正対象書類名】明細書

【補正対象項目名】0029

【補正方法】変更

【補正内容】**【 0 0 2 9 】**

この処理手段は、ゲーム機本体に備えられているマイクロコンピュータなどから送信される指示信号の所望する演算処理内容に対応して、第 1 および第 2 検出信号をインタフェースによるアナログ／デジタル変換した信号が、またはたとえば請求項 1 5 ～ 1 8 のように指示信号に対応して演算処理した信号が、予め設定された 1 または複数の弁別レベルに対してどの範囲に属するかを、1 回または複数回判断し、前記判断された範囲に対応して演算処理されたデータ信号をゲーム機本体の通信フォーマットに適合したデータ列で生成してゲーム機本体に導出する。

【手続補正 9】

【補正対象書類名】 明細書

【補正対象項目名】 0 0 3 0

【補正方法】 変更

【補正内容】**【 0 0 3 0 】**

本考案に従えば、処理手段は、第 1 および第 2 検出信号のアナログ／デジタル変換された信号をそのままレベル弁別して範囲を判断し、またはそのアナログ／デジタル変換された信号をゲーム機本体からの指示信号に対応して演算処理した信号をレベル弁別して判断し、この演算処理というのは、前掲の実用新案登録請求の範囲請求項 1 5 および請求項 1 6, 1 7, 1 8、ならびにその他の演算処理を含む。さらにデータ信号は、その判断された前記範囲に対応して演算処理されて、ゲーム機本体からの通信フォーマットに適合したデータ列で作成されて導出され、この演算処理されたデータ信号というのは、前記判断された範囲を表す信号であってもよく、またデータ列となるように作成された信号であってもよく、または前掲の実用新案登録請求項の範囲請求項 1 9 および請求項 2 0 ならびにその他の演算処理したデータ信号であってもよい。

【手続補正 1 0】

【補正対象書類名】 明細書

【補正対象項目名】 0033

【補正方法】 変更

【補正内容】

【0033】

請求項1, 4および5における第1および第2入力操作手段は、オプトエンコーダまたは光学式ロータリエンコーダ、トラックボール、ジョイスティックおよびホール素子などの磁気検出素子を用いた構成、光学式ジョイスティック、可変抵抗器などを用いた構成であってもよく、または操作によって静電容量が変化する構成であってもよく、さらに次に述べる手の押圧力によって変化するレベルを有する電気信号を導出する構成などであってもよい。

【手続補正11】

【補正対象書類名】 明細書

【補正対象項目名】 0034

【補正方法】 変更

【補正内容】

【0034】

請求項1および6の本考案に従えば、第1または第2入力操作手段によるアナログ操作によって、操作者の手のたとえば指などによって操作される押圧力に対応したレベルを有する第1または第2検出信号を導出する。すなわち第1または第2検出信号は、操作者の指などを含む手による押圧力に対応したレベルを有する電気信号である。これによって第1または第2入力操作手段の構成の小形化を図ることができ、入力操作装置におけるハウジングの外表面の場所の取合いの問題を解決することが容易であり、さらに操作性が良好である。

【手続補正12】

【補正対象書類名】 明細書

【補正対象項目名】 0037

【補正方法】 変更

【補正内容】

【0037】

請求項6, 7において、第1または第2検出信号は、操作される押圧力に対応したレベルを有し、この押圧力に対応したレベルを有する第1または第2検出信号を得るために、感圧部材を用いるようにしてもよく、このような感圧部材は、操作者の手の押圧力が、後述の実施の形態において操作部材35から直接に作用するように構成されていてもよく、またはその操作部材35が省略されて感圧部材32の表面を操作者の指などで直接に押圧操作する構成であってもよく、さらに本考案の実施の他の形態では、スティックまたはレバーなどの操作棒によって、または移動する部材などによって、感圧部材を押圧する構成を含む。

【手続補正13】

【補正対象書類名】明細書

【補正対象項目名】0135

【補正方法】変更

【補正内容】

【0135】

【考案の効果】

請求項2, 3および請求項4, 5の本考案によれば、従来ではゲーム機本体に備えられているマイクロコンピュータで演算処理していたキャラクタまたは背景の表示態様の変化、たとえば加速量、移動量およびキャラクタの一連の動作情報等を、本考案では入力操作装置に備えられている処理手段で演算処理してデータ信号を生成するようにしたので、ゲーム機本体に備えられているマイクロコンピュータの情報処理の負担が減り、その分、他の演算処理を行うことができるようになり、これによってゲームのいわゆるスピードアップが一層可能になる。

【手続補正14】

【補正対象書類名】明細書

【補正対象項目名】0136

【補正方法】変更

【補正内容】

【0136】

さらに請求項2, 3および5の本考案によれば、処理手段は、必要な種類の演

算処理を表す指示信号がゲーム機本体から与えられることによって、さらに請求項 5 では、第 1 および第 2 検出信号のレベル弁別をするなどの演算処理を行って、データ信号を導出するようにしたので、その入力操作装置における処理手段の演算処理動作は、必要なだけ行われることになり、無駄な動作がなくなり、その分、必要な演算処理量を多くし、これによってゲーム機本体に備えられているマイクロコンピュータの負担を軽減することが、さらに一層可能になる。

【手続補正 1 5】

【補正対象書類名】明細書

【補正対象項目名】0 1 3 8

【補正方法】変更

【補正内容】

【0 1 3 8】

請求項 1 および 6 の本考案によれば、第 1 または第 2 検出信号を得るための第 1 または第 2 入力操作手段は、指などの手で操作される押圧力に対応したレベルを有し、これによって操作性が向上されるとともに、構成の小形化を図り、取付場所の取合いの問題を解決しやすくなる。請求項 1 の検出装置ならびに請求項 6 における第 1 および第 2 入力操作手段では、たとえば後述の感圧部材を指などの手で直接に押圧操作する構成を含むのは勿論、さらにたとえば 3 6 0 度にわたって揺動可能な操作棒によって感圧部材などを押圧操作して第 1 または第 2 検出信号を導出する構成などをも含む。

【手続補正 1 6】

【補正対象書類名】明細書

【補正対象項目名】0 1 4 0

【補正方法】変更

【補正内容】

【0 1 4 0】

請求項 7 の本考案によれば、配線基板上に一对の電極を設け、その上に感圧部材を配置したので、構成が簡略化され、また小形化され、しかも生産性が優れており、安価に実現される。

UTILITY MODEL REG.NO.: 3040155

TITLE : INPUT OPERATION EQUIPMENT FOR HOME VIDEO GAME
MACHINES

APPLICATION NUMBER AND DATE: H08-10874 (1996 October 25)

CREATOR OF THE UTILITY MODEL: Sadao Hashiguti etal.

APPLICANT: Hori Electric Company (Hori Denki Kabushikikaisha)

*** NOTICES ***

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

CLAIMS

[Utility model registration claim]

[Claim 1] It is alter operation equipment for home video game machines which changes a character or the display mode of a background, and is this alter operation equipment. It has the 1st, the 2nd, and 3rd alter operation means. the 1st alter operation means Have the 1st pressurization means for showing all the directions of the position of operation, and it consists of two or more 1st detection equipments of an analog formula from which an electrical property changes with the press force by the 1st pressurization means. The 1st detecting signal detected from the 1st detection equipment is drawn. the 2nd alter operation means Have a 2nd pressurization means to show the direction of the shape of a straight line, and it consists of the 2nd detection equipment of an analog formula from which an electrical property changes with the press force by the 2nd pressurization means. The 2nd detecting signal detected from the 2nd detection equipment is drawn. the 3rd alter operation means It consists of the 3rd detection equipment which detects the state where it is not operated, and an operation state, and the 3rd detection equipment draws binary level. the alter operation equipment for these home use video game machines Furthermore, a detecting-signal processing means to generate the data signal showing a series of performance information for acquiring the 1st, the 2nd, and 3rd detecting signals through an interface, and operating a character or a background, Alter operation equipment for home video game machines characterized by having the means of communications which derives a data signal on the main part of a game machine.

[Claim 2] A processing means is alter operation equipment for home video game machines according to claim 1 characterized by performing data processing which answers the indication signal showing data processing of the required kind given from the main part of a game machine, and the indication signal expresses.

[Claim 3] The three-dimension-operation technique. In the alter operation equipment for home video game machines which generates the character in a game etc. A 1st operation means to generate the 1st detecting signal of the analog formula which can show all the directions of the position of operation, A 2nd operation means to generate the 2nd detecting signal of an analog formula, and a 3rd operation means to generate the 3rd detecting signal of a digital formula, The data-processing means for which is a processing means to have two or more data-processing meanses, and the main part of a game machine asks is judged. Or a multiple-times judgment is made. or [belonging the value which carried out analog-to-digital conversion of the 1st and 2nd detecting signals to which range to two or more thresholds beforehand set up by the data-processing means] -- 1 time -- Alter operation equipment for home video game machines characterized by including a processing means to generate the data stream of the data signal which suited the format of the main part of a game machine to make processing by the aforementioned data-processing means corresponding to the range perform, and to derive to the main part of a game machine.

[Claim 4] While showing all the directions of the position of operation in the alter operation equipment for home video game machines which changes a character or the display mode of a background to a screen, using the three-dimension-operation technique which divides the front face of a character or a

background into many fields, attaches shading to each field alternatively, displays in three dimensions, or changes a view position and is displayed in three dimensions. A 1st alter operation means to generate the 1st detecting signal of an analog formula, and a 2nd alter operation means to generate the 2nd detecting signal of an analog formula, A 3rd alter operation means to have level on the other hand, and to generate the 3rd detecting signal of the digital formula which has another side level by not being operated by being operated, The indication signal showing data processing of the required kind from the main part of a game machine is answered. The signal which carried out analog-to-digital conversion of the 1st and 2nd detecting signals, and carried out data processing of the signal by which analog-to-digital conversion was carried out or its signal by which analog-to-digital conversion was carried out corresponding to the indication signal Carry out level discrimination, judge the aforementioned range which belongs among two or more ranges of each defined beforehand, and the data signal by which data processing was carried out corresponding to the judged aforementioned range is created by the data stream which suited the communication format with the main part of a game machine. Alter operation equipment for home video game machines characterized by including a processing means to derive on the main part of a game machine.

[Claim 5] The 1st or 2nd detecting signal is alter operation equipment for home video game machines according to claim 3 or 4 characterized by having the level corresponding to the press force operated.

[Claim 6] the [the 1st or] -- the alter operation equipment for home video game machines according to claim 1 or 5 characterized by 2 alter operation meanses containing the pressure-sensitive part material which has the resiliency from which it is arranged over a rigid electric insulation wiring substrate, the electrode of the couple mutually adjoined and arranged on a wiring substrate, and the electrode of the aforementioned couple, and inter-electrode electric resistance changes with the press force by an operator's hand

[Claim 7] Two or more each class is accomplished,,it is prepared, and the electrode of the aforementioned couple is pressure-sensitive part material. It is one sheet and is arranged over the electrode of all groups. single -- the electrode of two or more groups Through pressure-sensitive part material, form a series circuit, connect, and the press force by operation is given on pressure-sensitive part material in the upper part near the electrode of at least one group. Alter operation equipment for home video game machines according to claim 6 characterized by deriving the partial pressure voltage from inter-electrode [of each class] as the 1st or 2nd detecting signal.

[Claim 8] The 1st alter operation means is an electrode which accomplishes two or more three or more each class, and is formed on a rigid electric insulation wiring substrate and this wiring substrate, and is the electrode of each class. The electrode by which is adjoined mutually, and a pair is accomplished, it is arranged and the electrode of each class is arranged on the closed loop on imagination, It is one sheet, and is arranged over the electrode of all groups, and the conductive pressure-sensitive part material which has the resiliency from which the inter-electrode electric resistance which accomplishes the pair of each class according to the press force changes is included. single -- the electrode of two or more groups Alter operation equipment for home video game machines according to claim 1, 3, or 4 characterized by forming a series circuit, connecting through pressure-sensitive part material, and deriving the partial pressure voltage from inter-electrode [of each class] as the 1st detecting signal of the above.

[Claim 9] The operating member which changes from a rigid material to an opposite side is prepared, and the electrode of the thickness direction of pressure-sensitive part material is in this operating member. Alter operation equipment for home video game machines according to claim 6, 7, or 8 characterized by the thing from which the amount of abrupt changes of the level of a detecting signal arises corresponding to the variation of the press force of operating member by establishing a displacement limit means to restrict the variation rate which resists the resiliency of pressure-sensitive part material so that pressure-sensitive part material may be beforehand compressed by operating member, and compressing pressure-sensitive part material beforehand out of range and done [the press operation of the operating member].

[Claim 10] The closed loop on the aforementioned imagination is each class which has the configuration of a point symmetry and accomplishes the pair of an electrode. It is arranged at a point symmetry, and it is prepared and even sets of four or more operating member which consists of a rigid material is included further. this operating member Alter operation equipment for home video game machines according to claim 8 characterized by for 2 sets of electrodes which have the periphery arranged on the surface of an opposite side, are supported free [rocking], and are in the position of a point symmetry forming a series circuit, and connecting them with the electrode of the thickness direction of pressure-sensitive part material through pressure-sensitive part material.

[Claim 11] It has a central hole, and is annular along with the closed loop on the aforementioned imagination, and pressure-sensitive part material is operating member. It has the support salient which inserts in the hole of the center of the above and is supported on a wiring substrate. the front face by the side of the pressure-sensitive part material of the aforementioned periphery of operating member It has the press side which inclined like. an axis to **** or ** of operating member -- taking -- the direction of an axis -- the aforementioned support salient to ****, or ** -- between the aforementioned press side and pressure-sensitive part material Alter operation equipment for home video game machines according to claim 8 or 10 characterized by the shock absorbing material which has resiliency intervening.

[Claim 12] Shock absorbing material is alter operation equipment for home video game machines according to claim 11 characterized by being divided by the hoop direction of a closed loop and arranged in right above [of each class].

[Claim 13] Alter operation equipment for home video game machines according to claim 10, 11, or 12 characterized by the thing from which the amount of abrupt changes of the level of a detecting signal arises corresponding to the variation of the press force of operating member by preparing a displacement limit means to restrict the variation rate which resists the resiliency of pressure-sensitive part material in operating member so that pressure-sensitive part material may be beforehand compressed by operating member, and compressing pressure-sensitive part material beforehand out of range and done [the press operation of the operating member].

[Claim 14] A processing means is alter operation equipment for home video game machines of one publication among the claims 1-13 characterized by changing into the digital value from which the level of the 1st or 2nd detecting signal serves as the primary value of a function of operation physical quantity, carrying out level discrimination and judging this digital value.

[Claim 15] A processing means is alter operation equipment for home video game machines of one publication among the claims 1-14 characterized by finding the operated speed, carrying out level discrimination and judging the speed of the change by the value change to which analog-to-digital conversion of the 1st or 2nd detecting signal was carried out [aforementioned].

[Claim 16] the signal with which, as for the processing means, analog-to-digital conversion of the 1st or 2nd detecting signal was carried out [aforementioned] -- the 1st -- the alter operation equipment for home video game machines according to claim 15 characterized by carrying out level discrimination on the 2nd discrimination level V_{t1} which exceeds the 1st discrimination level V_1 after the 1st time W_1 progress beforehand defined after becoming more than discrimination level V_1

[Claim 17] the signal with which, as for the processing means, analog-to-digital conversion of the 1st or 2nd detecting signal was carried out [aforementioned] -- the 3rd -- after the 2nd time W_2 progress beforehand defined after becoming less than [discrimination level V_2] -- the 3rd -- the alter operation equipment for home video game machines according to claim 15 characterized by carrying out level discrimination on the 4th discrimination level V_{t2} which is less than [discrimination level V_2]

[Claim 18] A processing means is alter operation equipment for home video game machines of one publication among the claims 1-14 characterized by carrying out level discrimination of the signal with which analog-to-digital conversion of the 1st or 2nd detecting signal was carried out [aforementioned] on discrimination level which is different in 1 or mutual [two or more].

[Claim 19] A processing means is alter operation equipment for home video game machines of one

publication among the claims 1-14 characterized by creating a data signal corresponding to correlation of the 3rd detecting signal in the range row by which a judgment of the 1st and 2nd detecting signals was made [aforementioned].

[Claim 20] A processing means is alter-operation equipment for home video game machines of one publication among the claims 1-14 which carry out level discrimination of the signal with which analog-to-digital conversion of the 1st or 2nd detecting signal was carried out [aforementioned] on discrimination level which is different in mutual [two or more], judge the aforementioned range and are characterized by to derive the serial data signal from which a logical value changes with time progress corresponding to the range by which a judgment was made [aforementioned].

[Claim 21] A processing means is alter operation equipment for home video game machines according to claim 20 which is one logical value and is characterized by deriving serially the data signal which is the logical value of another side in a residual frame with 1 or two or more frames corresponding to the range by which a judgment of [of two or more of those frames] was made [aforementioned] synchronizing with each frame of a screen by making into a unit two or more frame numbers defined beforehand.

[Claim 22] Alter operation equipment for home video game machines according to claim 6 characterized by including further the fixed resistance which is prepared on the aforementioned wiring substrate, is connected to one electrode of the electrodes of a couple in series, forms a series circuit with the inter-electrode pressure-sensitive part material of the aforementioned couple, and obtains partial pressure voltage as the 1st or 2nd detecting signal.

DETAILED DESCRIPTION

[Detailed explanation of a design]

[0001]

[The technical field to which a design belongs]

This design is related with the alter operation equipment used for a home video game machine.

[0002]

[Description of the Prior Art]

Typically, the main part of a game machine is connected to the television set used for a display, alter operation equipment is connected and the home video game machine from the former is constituted from a flexible line by this main part of a game machine. The microcomputer for displaying a target of operation or a character, and a background on screens, such as a cathode-ray tube of a television set, is built in the main part of a game machine. It has an alter operation means for alter operation equipment to be equipped with two or more push-buttons which derive a digital formula detecting signal, and to derive an analog formula detecting signal, and these detecting signals are directly given to the main part of a game machine through an analog / serial converter.

[0003]

In this advanced technology, with the microcomputer with which the main part of a game machine is equipped, since data processing of the change of acceleration of a character and the display mode of a background, for example, the amount of a character, movement magnitude, a series of performance information, etc. is carried out, the burden of this microcomputer is large, therefore obtaining the result of an operation takes time. With the alter operation equipment from the former equipped with two or more push-buttons, the binary detecting signal of the digital formula from each of this push-button is given to the main part of a game machine. In a fighting game, it corresponds to the stage of the strength of the punch which a character lets out individually, as shown in drawing 37, push-buttons 1, 2, and 3 are assigned individually, and the detecting signal for every stage of the weakness of punch, inside, and strength is drawn by this. In such advanced technology, the strength of punch cannot be further divided into many stages, and cannot be inputted, but the interest of a game will be reduced. Moreover, since the movement of a character becomes nonsequential, there is sense of incongruity to an operator's intention. Moreover, when the composition in which much more push-buttons 1, 2, and 3 are formed according to the strength of such punch, then the whole composition tend to turn on a large scale and it is going to use many push-buttons about operability, which push-button is the attack of powerful punch, it must always judge which button is the attack of weak punch, a push-button must be chosen, and there is also a problem that operation becomes complicated.

[0004]

Other advanced technology which solves this problem is indicated by JP,7-88252,A. In this advanced technology, it has the analog formula input device which consists of an OPUTO encoder, a trackball, and a joy stick, and the detecting signal outputted from these analog formula input devices is given to the main part of a game machine through a parallel/serial-conversion machine. In this advanced technology, since an OPUTO encoder, a trackball, and a joy stick are used as mentioned above, the structure is complicated, there are many part mark, and the number of erectors is applied, and it turns on a large scale, and there are problems -- a still higher assembly precision may be needed. An operator has alter operation equipment in a hand, and it is the hand, for example, is a finger etc., and since it is operated, especially a miniaturization is required.

[0005]

In other advanced technology, in order to obtain an analog formula detecting signal, an optical rotary encoder is used. In an optical rotary encoder, many slits are formed in a hoop direction and a phot

interrupter is prepared in a shading nature disk in relation to this slit.

A light emitting device is arranged at the direction one side of an axis of the aforementioned disk, a photo detector is arranged and this phot in adapter is constituted at the other side. Counting of the number of the pulses acquired from the photo detector corresponding to the light from the light emitting device through a slit is carried out by the counter.

[0006]

In this advanced technology, in order to improve the precision of angle of rotation of the hoop direction of a disk, the number of slits must be increased, therefore a slit must be formed minutely. Or you have to enlarge the speed increasing ratio of the gear train which an operator delivers the rotational-motion force of the operating member which carries out rotation operation to the aforementioned disk again. Therefore, in this advanced technology, composition becomes complicated, there are many part mark, and they turn on a large scale, the number of erectors is applied further, and there is a problem of becoming expensive.

[0007]

Other advanced technology is indicated by JP,6-149474,A, a hall device is arranged in the 4 of the direction of radiation directions focusing on the home position of a rectangular coordinates flat surface in a fixed position, the magnet magnetized by the perpendicular direction of the aforementioned flat surface is moved on the nonmagnetic base plate arranged above a hall device, and the composition which directs a magnet position by the output of a hall device is indicated. In this advanced technology, since it is necessary to move a magnet on a base plate, the space for it is required, therefore composition large-sized-izes. Moreover, since the output signal of a hall device is minute, the amplifier which amplifies the output must be built in alter operation equipment, and composition becomes complicated by this. Furthermore, a high precision is needed for the arrangement position of a hall device, and productivity is bad.

[0008]

The advanced technology of further others is the optical joy stick indicated by JP,6-119105,A, and a light emitting device is prepared in the edge of the rod in which an operator does rocking operation. the light from this light emitting device Through the condenser lens prepared in the fixed position, image formation is carried out to a photo detector, this photo detector is arranged and formed in each vertex position of the square on imagination of four photo-detector elements, and the output from each photo-detector element corresponding to the position of the spot of light is obtained.

[0009]

In this advanced technology, since the output signal from a photo-detector element is minute, amplifier is needed and composition becomes complicated by this. Moreover, a high precision is required for the arrangement position of a photo-detector element, and productivity is inferior.

[0010]

The advanced technology of further others is indicated by JP,8-103567,A. In this advanced technology, with right-and-left both hands, the grasping section of the couple grasped, respectively is connected possible [rotation] relatively, and the electrical signal corresponding to this rotation angle is derived using a variable resistor. A variable resistor tends to produce a poor contact etc. and has composition with it, there are many part mark, composition turns on a large scale, and the number of erectors is further applied by it, and it is expensive. [a short and life and] [complicated]

[0011]

Then, temporarily, composition is simplified, and though it is miniaturized, productivity is excellent and the composition for cheap alter operation can be devised, since dispersion in the property for every product is large, such composition is difficult to actually use it. Nevertheless, to lessen dispersion in the property for every product is desired.

[0012]

[Problem(s) to be Solved by the Device]

The purpose of this design is offering the alter operation equipment for home video game machines which improves the responsibility of change of a character and the display mode of a background as can perform the result of an operation by alter operation in a short time, and enabled it to improve the interest of a game by building in a processing means and making a part of operation which was being performed with the microcomputer with which the main part of a game machine is equipped from the former perform with this processing means.

[0013]

Composition is simplified, and it is miniaturized, and other purposes of this design are excellent in productivity, and are offering the improved alter operation equipment for home video game machines made it it is not only cheap, but dispersion of in the property for every product lost further.

[0014]

[Means for Solving the Problem]

This design is alter operation equipment for home video game machines which changes a character or the display mode of a background. This alter operation equipment It has the 1st, the 2nd, and 3rd alter operation meanses. The 1st alter operation means The 1st detecting signal which has the 1st pressurization means for showing all the directions of the position of operation, consisted of two or more 1st detection equipments of an analog formula from which an electrical property changes with the press force by the 1st pressurization means, and was detected from the 1st detection equipment

It *****. The 2nd alter operation means has a 2nd pressurization means to show the direction of the shape of a straight line. It consists of the 2nd detection equipment of an analog formula from which an electrical property changes with the press force by the 2nd pressurization means. The 2nd detecting signal detected from the 2nd detection equipment is drawn. The 3rd alter operation means Consisting of the 3rd detection equipment which detects the state where it is not operated, and an operation state, the 3rd detection equipment draws binary level. The alter operation equipment for these home use video game machines Further A detecting-signal processing means to generate the data signal showing a series of performance information for acquiring the 1st, the 2nd, and 3rd detecting signals through an interface, and operating a character or a background, It is alter operation equipment for home video game machines characterized by having the means of communications which derives a data signal on the main part of game machine.

[0015]

The detecting-signal processing means in a claim 1 is the detecting signal of the digital value which carried out analog-to-digital conversion of the detecting signal of the 1st and 2nd analog formulas, or the 3rd digital formula.

You may also include only the composition derived to ** and a bit serial, and may also include the composition which performs other data-processing operation further.

[0016]

the [in a claim 1 / the 1st and] -- 2 pressurization meanses The 1st pressurization means for consisting of the operating member 35 which carries out press operation directly by hands, such as a finger, with the gestalt of the below-mentioned operation, and showing all the directions of the position of operation You may be the operating member 35 by which press operation is carried out over 360 degrees which is explained in relation to below-mentioned drawing 3 - drawing 9 . You may be the composition which carries out press operation of the pressure-sensitive part material etc. over 360 degrees with joy sticks, such as a stick which can be rocked, or a lever, again. further again or the 2nd pressurization means You may be the operating member 35 which carries out press operation directly by hands, such as a finger, so that it may state in relation to below-mentioned drawing 31 - drawing 36 . Or you may be the composition which carries out press operation of the pressure-sensitive part material etc. with joy sticks, such as a stick which can be rocked to the circumference of 1 axis, or a lever. You may be the composition which furthermore moves operating member in the shape of a straight line by hands, such as a finger, and carries out press operation of the pressure-sensitive part material etc., and this 2nd pressurization

means includes the composition for pressurizing or decompressing pressure-sensitive part material etc. in the direction of the shape of a straight line. further -- the [this / the 1st and] -- the front face where press operation of the pressure-sensitive part material itself in case 2 pressurization meanses carry out press operation of the pressure-sensitive part material etc. directly by hands, such as a finger, is carried out -- containing -- the [these 1st / the / and] -- 2 pressurization meanses include all the composition that carries out press operation of the press means etc. further -- the [the 1st and] -- 2 pressurization meanses may be the composition that resist for example, not only the composition that carries out press operation but the spring force, press pressure-sensitive part material, an indicated block displaces, and optical composition, magnetic composition, or other composition detect movement of the indicated block [0017]

the [the 1st and] -- with the gestalt of the below-mentioned operation, 2 detection equipment may be the composition of detecting the variation rate of the aforementioned detecting-element-ed material with other gestalten of operation of this design, including electrodes 27-30,122,126, the pressure-sensitive part material 32, fixed resistance 123, etc., and may be other composition [0018]

the 3rd detection equipment -- a digital formula push-button -- you may be -- the [or] -- it is constituted like 2 alter-operation meanses 18 and 19, you may have the composition which makes binary the obtained digital value which carried out analog-to-digital conversion on one discrimination level, other composition may realize, and all the composition that derives binary level is included [0019]

Moreover, this design is set to the alter operation equipment for home video game machines which generates the character in a game etc. by the three-dimension-operation technique. A 1st operation means to generate the 1st detecting signal of the analog formula which can show all the directions of the position of operation, A 2nd operation means to generate the 2nd detecting signal of analog formula A 3rd operation means to generate the 3rd detecting signal of a digital formula, The data-processing means for which is a processing means to have two or more data-processing meanses, and the main part of a game machine asks is judged. Or a multiple-times judgment is made. or [belonging the value which carried out analog-to-digital conversion of the 1st and 2nd detecting signals to which range to two or more thresholds beforehand set up by the data-processing means] -- 1 time -- It is alter operation equipment for home video game machines characterized by including a processing means to generate the data stream of the data signal which suited the format of the main part of a game machine to make processing by the aforementioned data-processing means corresponding to the range perform, and to derive to the main part of a game machine. [0020]

Moreover, this design divides the front face of a character or a background into many fields, attaches shading to each field alternatively, and displays it on a screen in three dimensions. Or a character or the display mode of a background is set to the changing alter operation equipment for home video game machines, using the three-dimension-operation technique which changes a view position and is displayed in three dimensions. While showing all the directions of the position of operation A 1st alter operation means to generate the 1st detecting signal of an analog formula A 2nd alter operation means to generate the 2nd detecting signal of an analog formula, A 3rd alter operation means to have level on the other hand, and to generate the 3rd detecting signal of the digital formula which has another side level by not being operated by being operated, The indication signal showing data processing of the required kind from the main part of game machine is answered. The signal which carried out analog-to-digital conversion of the 1st and 2nd detecting signals, and carried out data processing of the signal by which analog-to-digital conversion was carried out or its signal by which analog-to-digital conversion was carried out corresponding to the indication signal Carry out level discrimination, judge the aforementioned range which belongs among two or more ranges of each defined beforehand, and the data signal by which data processing was carried out corresponding to the judged aforementioned range is

created by the data stream which suited the communication format with the main part of a game machine. It is alter operation equipment for home video game machines characterized by including a processing means to derive on the main part of a game machine.

[0021]

2 alter operation meanses are established. the [the 1st to which the important composition of this design generates the 1st and 2nd detecting signals of an analog formula to alter operation equipment, and] -- for example, [enable it / to change the character of a screen, or the display mode of a background continuously by the three dimension-operation technique, for example / not only] Further It is preparing the processing means realized with a microcomputer etc. in alter operation equipment, and making data processing share with it by this processing means.

[0022]

Therefore, since the processing means with which alter operation equipment is equipped as mentioned above can be made to perform a part of data processing [at least] of the microcomputer prepared in the main part of a game machine from the former, the burden by the side of the main part of a game machine can be made to mitigate. the [therefore, / the 1st, the 2nd, and] -- with the microcomputer of the main part of a game machine by operation of 3 alter operation meanses, time required to obtain the result of an operation can be shortened, the microcomputer of the part and the main part of a game machine can perform other data processing, and it becomes possible to make change of the character in a game and the display mode of a background speed up further of it, and it can improve the interest of a game

[0023]

Moreover, this design answers the indication signal showing data processing of the required kind to which a processing means is given from the main part of a game machine, and it is characterized by performing data processing which the indication signal expresses.

[0024]

Furthermore, it cannot say that the processing means is always performing much data processing, but only data processing which an indication signal directs can be performed like claims 2 and 4, and useless data processing cannot be performed, but time to obtain the result of an operation by this can be shortened.

[0025]

The data-processing means with which the processing means in a claim 3 is equipped includes the composition which performs each data processing, such as the utility model registration claim claims 14-21 shown above, or the composition which performs other data processing. Making a multiple-times judgment of to which range the value which carried out analog-to-digital conversion is belonged includes opening a time interval, carrying out analog-to-digital conversion twice or more, and performing data processing, in order to find the operated speed like the utility model registration claim claims 15-17 shown above.

[0026]

The processing means of a claim 3 judges the data-processing means for which the main part of a game machine asks, this data-processing means to want may be a data-processing means specified by the indication signal from the microcomputer of the main part of a game machine, or it includes the composition which the data-processing means is switched [composition] and operates it by the circuit changing switch operated by the operator with whom this alter operation equipment is equipped.

[0027]

When a character is a human body, change of the character in claims 1 and 4 or the display mode of a background includes at least the thing of a character or a background which a part, for example, the truncus, or membrum inferius of the human body etc. carries out movement etc., and is changed in part, while including that movement of the character itself or the background itself etc. changes by carrying out.

[0028]

The indication signal in claims 2 and 4 may be a signal showing the command which is an instruction, or you may be a signal showing the program which performs data processing given to the detecting-signal processing means of a claim 1, or the processing means of claims 3 and 4 from the main part of a game machine, and the aforementioned detecting-signal processing means or the aforementioned processing means performs data processing according to this program.

[0029]

This processing means corresponds to the contents of data processing for which the indication signal transmitted from the microcomputer with which the main part of a game machine is equipped asks. The signal by the interface which carried out analog-to-digital conversion the 1st and 2nd detecting signals Or for example, the signal which carried out data processing like claims 14-17 corresponding to the indication signal The data signal by which made a multiple-times judgment and data processing was carried out [to which range it belongs to 1 or two or more discrimination level which were set up beforehand, and] corresponding to 1 time or the range by which a judgment was made [aforementioned] is generated by the data stream which suited the communication format of the main part of a game machine, and it derives on the main part of a game machine.

[0030]

If this design is followed, level discrimination is carried out, the signal which the processing means carried out level discrimination of the signal with which analog-to-digital conversion of the 1st and 2nd detecting signals was carried out as it was, and judged the range, or carried out data processing of the signal by which analog-to-digital conversion was carried out corresponding to the indication signal from the main part of a game machine is judged, and this data processing includes other data processing in the utility model registration claim claim 14 shown above and claims 15, 16, and 17, and a row. Furthermore corresponding to the judged aforementioned range, data processing of the data signal is carried out. It is created and drawn by the data stream which suited the communication format from the main part of a game machine, and this data signal by which data processing was carried out You may be a signal showing the range by which a judgment was made [aforementioned], may be the signal created so that it might become a data stream, or may be the data signal in which others carried out data processing to the range claim 18 and claim 19 row of a utility model registration claim shown above.

[0031]

If this design is followed, the microcomputer with which the main part of a game machine is equipped will answer a data signal from alter operation equipment; and will express a character or a background on the screen of display meanses, such as cathode-ray tubes, such as a television set, as the three-dimension-operation technique. This three-dimension-operation technique divides into many small fields the front face of the sphere which is a character. It is the operation technique which attaches shading to each field alternatively and is displayed on it in three dimensions. moreover, this three-dimension-operation technique For example, it is the operation technique it is displayed that it can display in three dimensions from the view which changed the view position which looks at the building used as a background, and entered inside from from outside the building, for example, can see the transverse plane of the building, the side, a tooth back, an inside, etc. The interest of a game can be improved now by such three-dimension-operation technique.

[0032]

Moreover, this design is characterized by the 1st or 2nd detecting signal having the level corresponding to the press force operated.

[0033]

the [in claims 1, 3, and 4 / the 1st and] -- 2 alter-operation meanses may be the composition using the composition which used magnetic sensing elements, such as an OPUTO encoder or an optical rotary encoder, a trackball, a joy stick, and a hall device, the optical joy stick, the variable resistor, etc., or may be the composition that electrostatic capacity changes with operations, and may be composition which derives the electrical signal which has the level which changes with the press force of the hand described

further below

[0034]

if this design of claims 1 and 5 is followed -- the [the 1st or] -- the 1st or 2nd detecting signal which has the level corresponding to the press force operated with the finger of an operator's hand etc. by analog operation by 2 alter operation meanses is derived That is, the 1st or 2nd detecting signal is an electrical signal which has the level corresponding to the press force by the hand containing an operator's finger etc. this -- the [the 1st or] -- it is easy to be able to attain the miniaturization of the composition of 2 alter operation meanses, and to solve the problem of scramble of the place of the outside surface of housing in alter operation equipment, and operability is still better

[0035]

moreover, this design -- the [the 1st or] -- 2 alter operation meanses Rigid electric insulation wiring substrate Electrode of the couple mutually adjoined and arranged on a wiring substrate It is arranged over the electrode of the aforementioned couple and is characterized by including the pressure-sensitive part material which has the resiliency from which inter-electrode electric resistance changes with the press force by an operator's hand.

[0036]

If this design is followed, the electrical signal which the electric resistance through the inter-electrode pressure-sensitive part material of the couple on a wiring substrate changes, therefore has the level corresponding to the press force can be derived by carrying out press operation of the pressure-sensitive part material by the hand containing a finger etc. According to this composition, that the electrode of a couple is formed on one wiring substrate, and by using pressure-sensitive part material, composition is simplified and miniaturized, and productivity is excellent, therefore it realizes cheaply.

[0037]

In claims 5 and 6 the 1st or 2nd detecting signal In order to obtain the 1st or 2nd detecting signal which has the level corresponding to the press force operated, and has the level corresponding to this press force You may make it use pressure-sensitive part material. such pressure-sensitive part material The press force of an operator's hand may be constituted so that it may act directly from operating member 35 in the form of the below-mentioned operation. You may be the composition which the operating member 35 is omitted and carries out press operation of the front face of the pressure-sensitive part material 32 directly with an operator's finger etc. or with other forms of operation of this design, further The composition which presses pressure-sensitive part material is included by joy sticks, such as a stick or a lever, or the member which moves.

[0038]

About this design, in this way, although the press force may act on pressure-sensitive part material directly You may be the composition pressed through the component which exercises by operation of an operator. Without furthermore using pressure-sensitive part material, an operator presses by hand etc. the member which moves according to the spring force of a spring, and it is good also considering the variation rate of the member as optical composition, magnetic composition, and composition further changed into a detecting signal using other composition..

[0039]

Therefore, the press force by the operation in the aforementioned utility model registration claim etc. must be interpreted as the composition which detects the variation rate of the member which resists and moves to coiled spring etc. further, for example, and the thing which includes other composition etc. further including the composition which presses pressure-sensitive part material through the component of not only the composition that presses pressure-sensitive part material directly but others by hands, such as an operator's finger.

[0040]

Moreover, in this design, the electrode of the aforementioned couple accomplishes two or more each class, and it is prepared. Pressure-sensitive part material single -- it is one sheet and arranges over the

electrode of all groups -- having -- The electrode of two or more groups Through pressure-sensitive part material, a series circuit is formed and it connects. The press force by operation is given on pressure-sensitive part material in the upper part near the electrode of at least one group. It is characterized by deriving the partial pressure voltage from inter-electrode [of each class] as the 1st or 2nd detecting signal.

[0041]

if this design is followed -- two or more each class -- the electrode of a couple -- having -- single -- since it is arranged over the electrode of all groups, namely, the electrode of all groups is covered and common pressure-sensitive part material is used, the pressure-sensitive part material of one sheet can prevent dispersion in change of the electric resistance corresponding to the press force by dispersion in the property of pressure-sensitive part material as much as possible

[0042]

And if this design is followed, since the electrode of two or more groups will form a series circuit and will be connected through pressure-sensitive part material, the partial pressure voltage obtained from inter-electrode [of each class] corresponds to the ratio of the electric resistance by the pressure-sensitive part material of the voltage given to the ends of the series circuit. Whether dispersion in the property of the electric resistance corresponding to the press force of pressure-sensitive part material exists by this or the properties of pressure-sensitive part material differ for every alter operation equipment, dispersion in the level of the 1st or 2nd detecting signal of the analog formula given to the processing means by dispersion in such a property can be abolished. Since it is still easier to obtain partial pressure voltage on comparatively big level, amplifier is not needed.

[0043]

Moreover, this design is the 1st alter operation means. Rigid electric insulation wiring substrate It is the electrode which accomplishes two or more three or more each class, and is formed on this wiring substrate. the electrode of each class The electrode by which is adjoined mutually, and a pair is accomplished, it is arranged and the electrode of each class is arranged on the closed loop on imagination, Are one sheet, it is arranged over the electrode of all groups, and the conductive pressure-sensitive part material which has the resiliency from which the inter-electrode electric resistance which accomplishes the pair of each class according to the press force changes is included. -- single -- Through pressure-sensitive part material, the electrode of two or more groups forms a series circuit, and is connected. It is characterized by deriving the partial pressure voltage from inter-electrode [of each class] as the 1st detecting signal of the above.

[0044]

If this design is followed, on the closed loop on imagination, the electrode of three or more each class is arranged, and the 1st alter operation means for showing all the directions of the position of operation is constituted. This closed loop is a perfect circle, each class opens an interval in a hoop direction by a unit of 90 degrees, and may be arranged a total of 4 sets, and each class of this electrode is arranged at least three or more.

By obtaining the partial pressure voltage corresponding to each electrode by this, a press position can be known over all the directions.

[0045]

Moreover, in this design, the closed loop on the aforementioned imagination has the configuration of a point symmetry. Each class which accomplishes the pair of an electrode It is arranged at a point symmetry and even sets of four not lesses are prepared. The operating member which consists of a rigid material is included further. This operating member It has the periphery arranged on the surface of an opposite side with the electrode of the thickness direction of pressure-sensitive part material, and is supported free [rocking]. It is characterized by for 2 sets of electrodes in the position of a point symmetry forming a series circuit, and connecting them through pressure-sensitive part material.

[0046]

If this design is followed, each class which the closed loop on imagination may have the configuration of a point symmetry, for example, may be a perfect circle as mentioned above, and accomplishes the pair of an electrode Even sets of four not lesses are prepared. especially about this design By 2 sets of electrodes in the position of a point symmetry forming a series circuit, connecting them through pressure-sensitive part material, and using the rigid operating member which can be rocked freely When press operation is carried out in one group between two each class in a point symmetric position, in the group of another side, press operation is not carried out, but the electric resistance by the inter-electrode pressure-sensitive part material of this group by which press operation is not carried out can be used in order to obtain partial pressure voltage. In this way, in order to obtain partial pressure voltage, it is not necessary to prepare fixed resistance etc. and simplification of composition can be attained separately. The below-mentioned shock absorbing material may be omitted.

[0047]

Moreover, pressure-sensitive part material has a central hole, and this design's is annular along with the closed loop on the aforementioned imagination. Operating member It has the support salient which inserts in the hole of the center of the above and is supported on a wiring substrate. The front face by the side of the pressure-sensitive part material of the aforementioned periphery of operating member an axis to **** or ** of operating member -- taking -- the direction of an axis -- the aforementioned support salient to ****, or ** -- the press side which inclined like -- having -- It is characterized by the shock absorbing material which has resiliency intervening between the aforementioned press side and pressure-sensitive part material.

[0048]

If this design is followed, operating member has the support salient which inserts in the hole of the center of annular pressure-sensitive part material. When this support salient is supported on a wiring substrate, and rocking of supporter material of it is enabled, therefore press operation is carried out by one side of two symmetrical positions of a closed loop, in the position of another side, the press force cannot act and partial pressure voltage can be correctly obtained corresponding to a press position.

[0049]

if this design is furthermore followed -- the front face by the side of the pressure-sensitive part material of the periphery of operating member -- an axis to **** or ** of operating member -- taking -- the direction of an axis -- the aforementioned support salient -- **** or ** -- it has the press side formed in the shape of a truncated cone like, and shock absorbing material intervenes between this press side and pressure-sensitive part material Therefore, when press operation of the operating member is carried out, it will be pressed by pressure-sensitive part material by the most uniform possible pressure in the radiation direction from the point of symmetry through shock absorbing material. Therefore, while the big press force cannot act on pressure-sensitive part material partially and being able to prevent breakage of pressure-sensitive part material, the press force uniform in the radiation direction can act on the electrode of the couple of each class currently formed on the wiring substrate by pressure-sensitive part material from the point of symmetry, and the stable electric resistance depending on the press force can be acquired.

[0050]

Moreover, this design is characterized by for shock absorbing material being divided by the hoop direction of a closed loop, and being arranged in right above [of each class].

[0051]

The 1st detecting signal of each class which expresses the aforementioned middle position correctly when following this design and press operation of the middle position of each class in alignment with the hoop direction of the closed loop in the periphery of operating member is carried out

[0052]

Moreover, the operating member to which this design changes from a rigid material to an opposite side

with the electrode of the thickness direction of pressure-sensitive part material is prepared. In this operating member A displacement limit means to restrict the variation rate which resists the resiliency of pressure-sensitive part material so that pressure-sensitive part material may be beforehand compressed by operating member is established. By compressing pressure-sensitive part material beforehand It is out of range and is characterized by the thing from which the amount of abrupt changes of the level of a detecting signal arises corresponding to the variation of the press force of operating member and which is done for the press operation of the operating member.

[0053]

Moreover, a displacement limit means by which this design restricts the variation rate which resists the resiliency of pressure-sensitive part material so that pressure-sensitive part material may be beforehand compressed by operating member to operating member is established. By compressing pressure-sensitive part material beforehand, it is out of range and is characterized by the thing whose amount of abrupt changes of the level of a detecting signal arises corresponding to the variation of the press force of operating member and which is done for the press operation of the operating member.

[0054]

If this design is followed, even if it is in the state in which operating member has not carried out press operation by hands, such as an operator's finger, the press force will act so that a fixed pressure may be beforehand applied to pressure-sensitive part material and may compress. The detecting signal by press operation can be obtained now in the range which variation with the loose level of the detecting signal corresponding to the variation of the press force by the hand produces by this. Therefore, it corresponds to the slight variation of the press force by the hand, and is a detecting signal.

** level is not changed sharply and operability becomes good.

[0055]

Moreover, this design changes a processing means into the digital value from which the level of the 1st or 2nd detecting signal serves as the primary value of a function of operation physical quantity, and is characterized by carrying out level discrimination and judging this digital value.

[0056]

If this design is followed, it is changed into the digital value from which the level of the 1st or 2nd detecting signal serves as the primary value of a function, such as press force by hands, such as operation physical quantity, for example, a finger etc., or the amount of operation displacement, the value of nonlinear characteristics is changed into a linear value in this way, and it can use because of level discrimination. the [therefore, / the 1st or] -- data processing of the consecutiveness in a processing means can be performed correctly and easily irrespective of the property of 2 alter operation meanses

[0057]

Moreover, this design is characterized by for a processing means finding the speed of the value change to which analog-to-digital conversion of the 1st or 2nd detecting signal was carried out [aforementioned], and carrying out level discrimination and judging the speed of the change.

[0058]

If this design is followed, to the case of the value by which the analog / DETARU conversion of the 1st or 2nd detecting signal were carried out, for example, the digital formula signal which consists of 7 bits The speed of the value change showing 0-127 is found, for example, it asks for the time rate of change of the digital value corresponding to the press force by press operation, level discrimination of the speed of the change is carried out, one of two or more ranges is judged, and the data signal by which data processing was carried out corresponding to the judged range is derived. By this, change of the character in a game or the display mode of a background can be diversified, and the interest of a game can be improved. Moreover, such data processing has comparatively many execute steps, therefore about this design, although long time will be needed by the time it obtains the result of an operation when the microcomputer with which the main part of a game machine is equipped from the former tends to attain, since it performs such data processing by processing meanses, such as a microcomputer with which alter

operation equipment is equipped, does not need long time for obtaining the result of an operation, but can aim at speedup of a game.

[0059]

Moreover, this design is a processing means. The signal with which analog-to-digital conversion of the 1st or 2nd detecting signal was carried out [aforementioned] the 1st -- the 2nd discrimination level V_{t1} which exceeds the 1st discrimination level V_1 after the 1st time W_1 progress beforehand defined after becoming more than discrimination level V_1 -- level discrimination -- carrying out -- or -- A processing means the signal with which analog-to-digital conversion of the 1st or 2nd detecting signal was carried out [aforementioned] -- the 3rd -- after the 2nd time W_2 progress beforehand defined after becoming less than [discrimination level V_2] -- the 3rd -- it is characterized by carrying out level discrimination on the 4th discrimination level V_{t2} which is less than [discrimination level V_2]

[0060]

if this design is followed, it is shown in below-mentioned drawing 24 and below-mentioned drawing 25 -- as -- the [the 1st or] -- it can ask by level discrimination, speed, i.e., time rate of change, positive [of the operation in 2 alter operation meanses], or negative

[0061]

Moreover, this design is characterized by a processing means carrying out level discrimination of the signal with which analog-to-digital conversion of the 1st or 2nd detecting signal was carried out [aforementioned] on discrimination level which is different in 1 or mutual [two or more]. [0062]

If this design is followed, level discrimination of the digital value of the 1st or 2nd detecting signal can be carried out on one discrimination level, the binary signal of a digital formula can be obtained in this way, or level discrimination can be carried out on two or more mutually different discrimination level, this digital value can be divided into three or more ranges again, and it can judge. Although the strength of the punch in a fighting game can be divided into three stages by above-mentioned drawing 37 and can be inputted from the former by carrying out level discrimination of the 1st or 2nd detecting signal of an analog formula on two or more discrimination level as mentioned above especially this design -- further -- many stages -- dividing -- the [single moreover / the 1st or] -- while being able to input by 2 operation meanses and being able to attain the miniaturization of composition, change of the display mode of the character or the background of having met further by an operator's feeling is realizable

[0063]

Moreover, this design is characterized by a processing means creating a data signal corresponding to correlation of the 3rd detecting signal in the range row by which a judgment of the 1st and 2nd detecting signals was made [aforementioned].

[0064]

the 1- which will be obtained by operation of the 1st - the 3rd alter operation means if this design is followed -- a data signal is created corresponding to the correlation which is the combination pattern of each 3rd detecting signal Therefore, change of many of characters in a game or display modes of a background can be obtained.

[0065]

Moreover, a processing means carries out level discrimination of the signal with which analog-to-digital conversion of the 1st or 2nd detecting signal was carried out [aforementioned] on discrimination level which is different in mutual [two or more], and this design judges the aforementioned range, and is characterized by deriving the serial data signal from which a logical value changes with time progress corresponding to the range by which a judgment was made [aforementioned].

[0066]

if this design is followed -- the [the 1st or] -- by operation of 2 alter operation meanses, the data signal which changes serially can be drawn and the main part of a game machine can be given The character of the screen in a game or the display mode of a background can be changed still more mostly by this. And such data processing needs comparatively many numbers of steps, in the advanced technology, although

it is necessary to make the microcomputer with which the main part of a game machine is equipped realize, since it performs such data processing by the processing means with which alter operation equipment is equipped, can mitigate the burden of the microcomputer of the main part of a game machine, and can improve speedup of a game about this design.

[0067]

Moreover, with 1 or two or more frames corresponding to the range by which the processing means made the unit two or more frame numbers defined beforehand synchronizing with each frame of a screen, and a judgment of [of two or more of those frames] was made [aforementioned], this design is one logical value and is characterized by deriving serially the data signal which is the logical value of another side by the residual frame.

[0068]

If this design is followed, synchronizing with each frame of the screen in display meanses, such as a television SHON receiver, a character or the display mode of a background can be changed so that it may mention later in relation to drawing 15 . the [for example, / the 1st or] -- when it has the composition by which press operation of the 2 alter operation meanses is carried out, the traverse speed of a character or a background can be changed according to the 1st or 2nd detecting signal obtained corresponding to the press force

[0069]

Moreover, this design is characterized by including further the fixed resistance which is prepared on the aforementioned wiring substrate, is connected to one electrode of the electrodes of a couple in series, forms a series circuit with the inter-electrode pressure-sensitive part material of the aforementioned couple, and obtains partial pressure voltage as the 1st or 2nd detecting signal.

[0070]

If this design is followed, in order to obtain partial pressure voltage further, the fixed resistance which forms a series circuit will be prepared on the wiring substrate in which the electrode of a couple was formed, so that it may mention later in relation to drawing 31 - drawing 33 . Therefore, while assembly operation becomes easy, it is also possible to simplify composition and to miniaturize.

[0071]

[The gestalt of implementation of a design]

Drawing 1 is the plan simplifying and showing the composition of the one whole gestalt of operation of this design, and drawing 2 is the block diagram simplifying and showing the composition of the home whole video game machine. The main part 6 of a game machine is fundamentally connected to the television set 5 used for a display through a line 7, by the flexible line 8, the alter operation equipment 9 which is a controller is connected, and a home video game machine is constituted from an input/output interface 65 by this main part 6 of a game machine. A character 12 and a background 13 are displayed on Screen 11 of the display meanses 10, such as a cathode-ray tube of a television set 5, or liquid crystal.

Data processing of the main part 6 of a game machine is answered and carried out to a data signal from the disk 14 which is the record medium with which the program of a game was recorded, and the alter operation equipment 9 which reads the program and minds the flexible line 8, and it contains the microcomputer 15 which creates the video signal for the display of a television set 5.

[0072]

This microcomputer 15 performs data processing which divides the front face of a character 12 or a background 13 into many fields, and performs data processing which attaches shading to each field alternatively and is displayed on it in three dimensions on Screen 11 of the display means 10, or changes a view position into it, and is displayed on it in three dimensions by the three-dimension-operation technique. Furthermore, this microcomputer 15 performs data processing for answering a data signal from alter operation equipment 9, and changing a character 12 or the display mode of a background 13. The synchronizing signal which synchronized with level/vertical synchronizing signal of the video signal given to a television set 5 from the main part 6 of a game machine is given to the processing means 16

realized with the microcomputer with which alter operation equipment 9 is equipped again, and the processing means 16 creates and derives a data signal by this by the data stream which suited the communication format with the main part 6 of a game machine.

[0073]

The 1st alter operation means 17 which is an analog control button, the 2nd alter operation meanses 18 and 19 which are analog multiple-purpose buttons, and two or more 3rd alter operation meanses 20 and 21 which are digital formula push-buttons are formed in the housing 22 grasped by an operator's hand, and alter operation equipment 9 is constituted. It can be arranged at the left part of housing 22, press operation can be carried out with an operator's, for example, a left hand, finger etc., and the 1st alter operation means 17 can generate the 1st detecting signal of the analog formula which shows all the directions of the actuated valve position, and can direct the character 12 in a game, and the directivity of movement of a background 13 by this. The 2nd alter operation meanses 18 and 19 are arranged at right and left of the anterior part of housing 22, are used for the various uses in a game, and generate the 2nd detecting signal of an analog formula. the [these 1st / the / and] -- 2 alter operation meanses 17; -- the 1st and 2nd detecting signals from 18 and 19

The central-process circuit 24 of the processing means 16 is given through ** and an analog-to-digital converter 23. They are arranged at the center and right part of housing 22, on the other hand, the 3rd alter operation meanses 20 and 21 have level, for example, high level, by carrying out press operation, and by not carrying out press operation, generate the 3rd detecting signal of the digital formula which has another side level, for example, a low level, and give it to the central-process circuit 24 of the processing means 16.

[0074]

the central-process circuit 24 with which the processing means 16 is equipped answers an indication signal from the microcomputer 15 of the main part 6 of a game machine, and the analog-to-digital converter 23 which works as an interface is operated -- making -- the [the 1st and] -- 2 alter operation meanses 17; -- analog-to-digital conversion of the 1st and 2nd detecting signals from 18 and 19 is carried out This indication signal

It is a signal showing the required processing which should be carried out data processing in ** and the central-process circuit 24. The signal by which analog-to-digital conversion was carried out, or the signal which carried out data processing so that the digital-conversion value which turns into the primary value of a function of the press force like the after-mentioned in the signal by which analog-to-digital conversion was carried out corresponding to an indication signal might be calculated the central-process circuit 24 It judges by carrying out level discrimination of the aforementioned range which belongs among two or more ranges of each defined beforehand. The data signal obtained by carrying out data processing corresponding to the judged aforementioned range is created and derived by the data stream which suited the communication format with the microcomputer 15 of the main part 6 of a game machine.

[0075]

An indication signal may be a signal showing the computer program for performing data processing in a command, an instruction, and the central-process circuit 24, and may be a signal including the information on other.

[0076]

Drawing 3 is drawing of longitudinal section of the 1st alter operation means 17, drawing 4 is the plan which the 1st alter operation means 17 simplified, and drawing 5 is the cross section seen from cutting plane line V-V of drawing 3 . With reference to these drawings, the rigid electric insulation wiring substrate 26 consists of synthetic resin, such as for example, a paper phenol, and each class 27-30 of three or more plurality, the gestalt of this operation four or more even number, for example, 4, is formed on this wiring substrate 26. The electrodes 27a and 27b of a couple adjoin mutually, and one group 27 opens an interval and is arranged. Moreover, similarly, the electrodes 28a and 28b of a couple adjoin

mutually, and one group 28 opens an interval, is arranged and has composition with other same groups 29 and 30.

[0077]

On the closed loop 31 which has the configuration of the point symmetry on imagination, around the point of symmetry 42, at equal intervals, these groups 27-30 open an interval in a hoop direction by a unit of 90 degrees with the gestalt of this operation, and are arranged, for example. A closed loop 31 is a perfect circle with the gestalt of this operation. Each aforementioned electrode of each class 27-30 may consist of copper, aluminum, carbon, and other conductive material. Each class 27 and 28 which accomplishes the pair of an electrode is arranged at a point symmetry, and each class 29 and 30 is arranged at a point symmetry.

[0078]

the pressure-sensitive part material 32 -- single -- it is one sheet, and it is arranged over the electrode of all the groups 27-30, has the resiliency from which the electric resistance between electrode 27a which accomplishes the pair of one group 27, and 27b changes according to the press force of the thickness direction (drawing 3 and the vertical direction of drawing 5) by operation of hands, such as an operator's finger, and is conductivity The electric resistance of the pressure-sensitive part material 32 pressed between electrode 28a which accomplishes the pair of other one group 28, and 28b changes, and, as for this, the same is said of the residual groups 29 and 30. The pressure-sensitive part material 32 consists of constituents of graphite, such as pressure-sensitive conductive rubber, and conductive rubber. The pressure-sensitive part material 32 is an annular board which has the central hole 33 and meets the aforementioned closed loop 31.

[0079]

the periphery 36 of rigidity [operating member / 35] which consists of synthetic-resin material and is arranged on the surface of an opposite side (upper part of drawing 3) in the groups 27-30 of the electrode of the thickness direction of the pressure-sensitive part material 32 -- having -- further -- the center of the pressure-sensitive part material 32 -- it has the support salient 37 which inserts in a hole 33 and is directed on the wiring substrate 26 the front face by the side of the pressure-sensitive part material 32 of a periphery 36 -- right and left of the axis 38 of operating member 35 to drawing 3 -- **** or ** -- taking -- the axis 38 direction (the vertical direction of drawing 3) -- the support salient 37 to ****, or ** -- it is the press side 39 which inclined up like

[0080]

Between this press side 39 and the pressure-sensitive part material 32, the shock absorbing material 40 which has resiliency intervenes. Shock absorbing material 40 consists of electric insulation synthetic resin or synthetic rubber etc. which has resiliency and which has elasticity and tensile strengths, such as a styrene thermoplastic elastomer, for example. This shock absorbing material 40 is individually formed each class 27-30 on the pressure-sensitive part material 32, and in the natural state where the press force is not acting, it has the wedge-shaped cross-section configuration where thickness increases as it becomes a method of the outside of radial. That is, shock absorbing material 40 is right above [of each class 27-30], and is individually arranged a total of four pieces on the pressure-sensitive part material 32. this shock absorbing material 40 -- the center of the pressure-sensitive part material 32 -- in the natural state where the press force is not acting, it is formed so that the thickness may become large as it becomes a method of the outside of radial from a hole 33 By drawing 4 , in order to make an understanding easy, a slash is attached and shown in the pressure-sensitive part material 32 and shock absorbing material 40.

[0081]

An outward flange 41 is formed in the periphery 36 of operating member 35. the insertion to which this outward flange 41 was formed in the housing 22 of alter operation equipment 9 -- it is depressed in contact with the inside which is an inferior surface of tongue in drawing 3 of a hole 43 the control unit 44 of operating member 35 -- insertion -- from a hole 43, it exposes to a way outside housing 22, and projects

partially above drawing 3

[0082]

Drawing 6 is the cross section which the 1st alter operation means 17 of other gestalten of operation of this design simplified. the operating member 35 which consists of a rigid electric insulation material -- for example, disc-like -- it is -- moreover, the pressure-sensitive part material 32 -- single -- it is disc-like [of one sheet], and other composition is the same as that of the gestalt of the operation explained in relation to above-mentioned drawing 3 - drawing 5 , and gives the same reference mark to a corresponding portion With the gestalt of this operation, although the support salient 37 shown in above-mentioned drawing 3 is not formed, the electric resistance by the pressure-sensitive part material 32 of each class 27-30 corresponding to the position by which press operation is carried out changes to operating member 45.

[0083]

Drawing 7 is the electrodes 27a and 27b of each class 27-30 formed on the wiring substrate 26.;

They are 28a and the plan showing 28b;-- Electrodes 27a and 27b are formed in Kushigata, and are the same also about the other groups 28-30. Although it is prolonged in radial [of a closed loop 31] and Electrodes 27a and 27b may be arranged as shown in above-mentioned drawing 4 , as shown in drawing 7 , it is prolonged in the hoop direction of a closed loop 31, and they may be arranged at it.

[0084]

Drawing 8 is the electrical diagram showing the connection state of each class 27-30 of an electrode. The series circuit 52 electrode 27a of each class 27 and 28 arranged by the point symmetry, 27b;28a, and 28b mind the pressure-sensitive part material 32 by the line 51 is formed. As for the one side edge of this series circuit 52, voltage Vcc is given from the one side terminal of DC power supply, and an another side edge is grounded by common potential. Moreover, through the pressure-sensitive part material 32, voltage Vcc is connected by forming a series circuit 56 of a line 53, and connecting the one side edge to the one side terminal of DC power supply, and, as for an another side edge, the electrode of each class 29 and 30 arranged similarly at the point symmetry is also grounded at common potential. According to the press force, electric resistance changes and the pressure-sensitive part material 32 of these each class 27-30 is shown with the signs 47-50 of variable resistance at drawing 8 , respectively.

[0085]

In the 1st alter operation means 17, since all the directions of a press actuated valve position are expressed, a reference mark 47 works as a right key, and a reference mark 48 works as a left key, a reference mark 49 works as an upper key, and a reference mark 50 commits it as a lower-key. The partial pressure voltage from lines 51 and 53 is drawn from output terminals 54 and 55, respectively. By forming the electrodes 27a and 27b of the couple of one group 27 in the common wiring substrate 26, composition is simplified and it is the same also about the other groups 28-30.

[0086]

Drawing 9 is the electrical diagram which ****(ed) a part of electrical circuit shown in drawing 8 relevant to the right key 47 and the left key 48. The partial pressure voltage V0 obtained from an output terminal 54 is shown by the formula 1, when setting the resistance of the right key 47 to R1 and setting the electric resistance of the left key 48 to R2.

[0087]

$$V0 = R2 \text{ and } Vcc / (R1 + R2) \text{ -- (1)}$$

if the control unit [axis / of operating member 35 / 38] 44 shifted is pressed -- a buffer -- a pressure joins the pressure-sensitive part material 32 through a member 40, and the electric resistance between electrode 27a in the pressure-sensitive part material 32 27, for example, one group, and 27b changes corresponding to the press force The partial pressure voltage V0 of an output terminal 54 changes with these according to the press force. The electric resistance value between electrode 27a obtained to the pressure of the pressure-sensitive part material 32 and 27b is 100ohms of numbers from several 10komega.

[0088]

For example, it is set to output voltage V_0 = abbreviation 0.003V, if the electric resistance between electrode 27a by the pressure-sensitive part material 32 and 27b is 30kohm, the left key 48 of the group 28 which accomplishes a pair is pressed and the electric resistance between electrode 28a and 28b is 300ohms, when voltage V_{cc} =3V of DC power supply and the press force are zero. When each press force of the right key 47 and the left key 48 is zero, the voltage V_0 of an output terminal 54 is set to 1.5V. Therefore, it is the range of sufficient value to be able to use it with a small SN ratio in the processing means 16, without amplifying without setting the variation of voltage V_0 to about 1.5 V, and such a value needing amplifier from the viewpoint of business.

[0089]

Drawing 10 is a graph which shows the property corresponding to the press force according the electric resistance between electrode 27a by the pressure-sensitive part material 32 in one group 27, and 27b to operating member 35. According to the lot at the time of manufacture of the pressure-sensitive part material 32, various kinds of properties of lines 57-59 are acquired. the range A1 below value P1 which the press force of the pressure-sensitive part material 32 defines beforehand according to these lines 57-59. -- the press force -- responding -- electric resistance -- a logarithm -- change of the electric resistance corresponding to change of a pressure at the range B1 which changes rapidly with a function [-like] and exceeds the press force P1 is loose

[0090]

Whenever it follows the view of this design, drawing 3 is caudad depressed for the outward flange 41 of operating member 35 explained in above-mentioned drawing 3 with housing 22, and the pressure P1 of drawing 10 defined beforehand will act beforehand, and will be made into a compression state at the pressure-sensitive part material 32. housing 22 -- the outward flange 41 of operating member 35, therefore a buffer -- the work which restricts the variation rate which resists the resiliency of the pressure-sensitive part material 32 so that the pressure-sensitive part material 32 may be made to compress beforehand through a member 40 -- carrying out -- therefore, the variation rate of the claim 11 of the above-mentioned [this housing 22] -- a limit means is committed Therefore, by carrying out press operation of the control unit 44 of operating member 35, the right key 47 from which the electric resistance between electrode 27a and 27b changes in the range B1 exceeding this pressure P1, therefore electric resistance changes gently corresponding to change of the press force will be attained. This is the same also about other each class 28-30.

[0091]

The pressure-sensitive part material 32 has a remarkable solid-state difference by production lot, as shown in the lines 57-59 of above-mentioned drawing 10 . with the gestalt of operation of this design, this pressure-sensitive part material 32 is not used independently, respectively every key 47-50 for each class 27-30, but common to these keys 47-50 -- single -- the pressure-sensitive part material 32 of one sheet is used The solid-state difference which originated in dispersion for every pressure-sensitive part material 32 in each position of each keys 47-50 by this will be generated at same rate. this solid-state difference is the same -- comparatively -- coming out -- being certain -- single -- by two arbitrary places of the pressure-sensitive part material 32 of one sheet, for example, one gestalt of this operation the group 27 symmetrical with a point, and 28; -- 29 and 30 -- therefore, each key 47 and 48; -- by using for 49 and 50 as partial pressure resistance As the electric resistance of two places which constitutes these series circuits will also change at same rate and is shown in the above-mentioned formula 1, the partial pressure voltage V_0 outputted is not influenced of the solid-state difference of the pressure-sensitive part material 32. namely, -- even if the solid-state difference of the property of the pressure-sensitive part material 32 exists for every lot in a formula 1 -- the partial pressure voltage V_0 -- the ratio of electric resistance -- since it is determined by $R_2/(R_1+R_2)$, dispersion in the partial pressure voltage V_0 by dispersion in the solid-state difference does not arise, and, moreover, the partial pressure voltage V_0 does not vary corresponding to the value of a pressure

[0092]

In the 1st alter operation means 7, the right key 47 and the left key 48 corresponding to each class 27 and 28 arranged in the position of a point symmetry are not pressed simultaneously, and, similarly the upper key 49 and the lower key 50 are not pressed simultaneously. When it follows, for example, the upper key 49 is pressed, so to speak, the electric resistance of the electrode 30 by the pressure-sensitive part material 32 corresponding to the position of the lower key 50 is committed as a resistor of a dummy, in order to obtain partial pressure voltage. Moreover, when the right key 47 is pressed similarly, the pressure-sensitive part material which acquires the electric resistance of the left key 48 works as a resistor of a dummy. In order to do in this way and to obtain the partial pressure voltage for every key 47-50 corresponding to each class 27-30 with the 1st alter operation means 17 It is not necessary to form the individual fixed resistance 123 shown in below-mentioned drawing 31 - drawing 33 . Moreover, there is an advantage that it becomes impossible for the group 126 of the electrodes 126a and 126b in drawing 34 - drawing 36 and the long and slender pressure-sensitive part material 32 to be required, they can make the pressure-sensitive part material 32 small, can do in this way, and can attain simplification of composition.

[0093]

The 2nd alter operation meanses 18 and 19 also have the same composition as each keys 47-50 of the 1st alter operation means 17, and are equipped with the composition of an independent key. With this composition, for example in the 2nd alter operation means 18, in order to form the electrodes 27a and 27b of the same couple as the above-mentioned group 27, to arrange the pressure-sensitive part material 32 over these electrodes 27a and 27b and to obtain the partial pressure voltage V_0 further In order to obtain resistance of a dummy in series to these electrodes 27a and 27b, the electrode of the couple which has the same composition is prepared, it extends, and the same pressure-sensitive part material is arranged, or the fixed resistance of a dummy is connected again, and a series circuit is formed in this way. The 2nd alter operation meanses 18 and 19 are independent switches, and other composition is similar to the composition of the above-mentioned 1st alter operation means 17.

[0094]

the [the 1st described in relation to drawing 3 - drawing 10 , and] -- 2 alter operation meanses 17; -- while being simplified, being able to miniaturize 18 or 19 composition, and productivity's being excellent and being able to realize cheaply, dispersion in the property for every product is lost still as mentioned above, and, moreover, output partial pressure voltage is large to the grade which does not need amplifier

[0095]

The partial pressure voltage from output terminals 54 and 55 is changed into digital value in the analog-to-digital converter 23 in the processing means 16, and has the property of a line 61 shown in drawing 11 . the line 61 of this drawing 11 , and the lines 57-59 of above-mentioned drawing 10 -- the pressure-sensitive part material 32 -- the logarithm of the press force -- deriving the electric resistance which carried out change of-like is shown Variation ΔR_1 , ΔR_2 , and ΔR_3 of the electric resistance of the electrodes [in / one group 27 / for example] 27a and 27b when seting constant the variation ΔP_1 , ΔP_2 , and ΔP_3 of the press force in drawing 11 $\Delta R_1 > \Delta R_2 > \Delta R_3$ -- (2) There is *****.

[0096]

The central-process circuit 24 carries out data processing of the line 61 of the digital value depending on the pressure-sensitive part material 32 of drawing 11 by which analog-to-digital conversion was carried out, and it changes so that it may become the line 62 which shows the property of digital value used as the primary value of a function of the press force. You may make it use the output of an analog-to-digital converter 23 as it is with other gestalten of operation of this design for other data processing. In order that the central-process circuit 24 may carry out data processing of the property shown with a line 62 from the property of a line 61 The store of the table showing the digital value of the line 62 corresponding to the digital value of the line 61 is beforehand carried out to the register of memory 63. The output of an

analog-to-digital converter 23 is answered, and you may make it read the content of a store. with other gestalten of operation of this design It substitutes for the operation expression which defines beforehand the digital value shown with a line 61, and you may make it output the digital value which has the property shown with a line 62.

[0097]

Drawing 12 is a flow chart for explaining operation of the central-process circuit 24 in the processing means 16. The central-process circuit 24 receives the synchronizing signal of a screen while receiving the indication signal which requires the data signal needed for data processing of a game through the flexible line 8 from serial input / output interface 65 from the microcomputer 15 of the main part 6 of a game machine. It moves from Step S1 to Step S2, and the content of a demand which the indication signal expresses is judged, for example, the character 12 in a game or a series of operation of a background 13, movement magnitude, the amount of acceleration, etc. are judged. step S3a-S3c -- the 1st - the 3rd alter operation means 17; 18, and 19; -- the 1st from 20 and 21 - the 3rd detecting signal are received, incorporation of data is performed, and data processing of the correlation which is those combination of the 1st - the 3rd detecting signal is carried out in step S4a-S4c The aforementioned range which belongs among two or more ranges of each which carry out level discrimination which performs a series of operation of a character 12 or a background 13 like below-mentioned drawing 13 - drawing 15 , and are beforehand defined by step S5a by this is judged. Moreover, similarly, the range by the level discrimination about a character 12 or the movement magnitude of a background 13 is judged, by step S5c, level discrimination about acceleration is carried out and the range is judged at step S5b further again. The incorporation of the data in the above-mentioned step S3a-3c is the 1st and 2nd detecting signals.

Although the digital value from the ** analog-to-digital converter 23 may be used as it is, as stated in relation to above-mentioned drawing 11 , you may be made to perform consecutive data processing to the primary value of a function corresponding to the press force using the digital value which carried out data processing.

[0098]

The digital value which carried out analog-to-digital conversion of the analog formula detecting signal obtained with alter operation equipment to the binary digit in the advanced technology Although data processing which changes into the information showing a series of operation of the character in for example, the amount of acceleration, movement magnitude, and a game etc. the digital value of the binary digit which gave the microcomputer of the main part of a game machine then, and was given from the alter operation equipment is performed and it can cook With the gestalt of operation of this design, from the microcomputer 15 of the game main part 6 The indication signal which it is required of the main part 6 of a game machine, i.e., expresses data processing which should be performed in alter operation equipment 9 Since it gives the processing means 16 of alter operation equipment 9 and the central-process circuit 24 of this processing means 16 generates the data signal corresponding to the content of this indication signal The burden of information processing of the microcomputer 15 of the main part 6 of a game machine in this design is mitigable, and the part and a microcomputer 15 can operate because of other data processing, and can aim at speedup of a game in this way.

[0099]

At Step S6 in drawing 12 , the data signal by which data processing was carried out corresponding to the range which is acquired by step S5 a-S5c, and by which a judgment was made [aforementioned] is the data stream which suited the communication format with the microcomputer 15 of the main part 6 of a game machine in the following step S6, and the store of it is carried out to an output register 64, and it is stored in it.

[0100]

In Step S7, if the indication signal showing the demand of a data signal is received from the microcomputer 15 of the main part 6 of a game machine, in the following step S8, the data signal will be

drawn through the flexible line 8 by the main part 6 of a game machine. Next, reception of the signal with which the end of a game is expressed from the main part 6 of a game machine in Step S9 ends a series of operation at Step S10.

[0101]

Drawing 13 is drawing for explaining the display mode of Screen 11 in the display means 10 by operation of alter operation equipment 9. Drawing 13 (1) is the plan of the 1st alter operation means 17. By carrying out press operation of the right key 47, as shown in drawing 13 (2), on Screen 11, a character 12 moves in the move direction 164 of the method of the right. In the advanced technology, if it continues pressing the push-button to the right in alter operation equipment, the character 12 has composition which moves rightward [164] at a fixed speed in Screen 11.

[0102]

Operation relevant to one form and the conventional technology of operation of such this design is further explained with reference to drawing 14. The state where press operation of the keys 47-50 in the 1st alter operation means 17 is not carried out is shown in drawing 14 (1), and the character 12 has stopped in Screen 11 at this time. ** [operation of the push-button to the right / move / continue / like drawing 14 (2) / through positions 67-69 / only the time corresponding to the time currently operated / a character 12 / at a fixed speed / from the first position 66 / with the advanced technology]

On the other hand, the digital value is the analog type 1st detecting signal corresponding to the resistance of the pressure-sensitive part material 32 by changing the 1st detecting signal of the 1st alter operation means 17 into digital value with the resolution of 7 bits in an analog-to-digital converter 23 with the form of operation of this design like drawing 14 (1), drawing 14 (3) - drawing 14 (6).

It is alike, and it can respond and the digital value to 0-127 can be obtained. This digital value is divided into the 1st range which is 0, the 2nd range of 1-32, the 3rd range of 33-64, the 4th range of 65-96, and the 5th range of 97-127, level discrimination is carried out corresponding to the press force of the 1st alter operation means 17, the range is judged, and operation of drawing 14 (1), drawing 14 (3) - drawing 14 (6) is performed according to this. When the alter operation means 17 is not operated, it is in the state of drawing 14 (1).

[0103]

Drawing 15 is a wave form chart for explaining operation of the processing means 16 in alter operation equipment 9. The synchronizing signal shown in drawing 15 (1) through the flexible line 8 is given, and synchronizing with this synchronizing signal, the processing means 16 derives the data signal corresponding to the press force of the 1st alter operation means 17 from the main part 6 of a game machine, as shown in drawing 15 (2) - drawing 15 (6). Drawing 15 (2) shows the wave of the data signal in the state where press operation of the 1st alter operation means 17 is not carried out.

[0104]

When press operation of the 1st alter operation means 17 is carried out and the aforementioned digital value is in the 1st range of the above of 1-32, a data signal The frame number of plurality (the gestalt of this operation 4) of a screen defined beforehand is made into a unit like drawing 15 (3). It is one logical value, i.e., a low level, with 1 or two or more frames corresponding to the range by which a judgment of [of two or more of those frames] was made [aforementioned], and the high-level data signal which is the logical value of another side is serially derived with a residual frame (the zero of a frame are included). When this 1st range is judged, with the frame of a couple, it is a low level, and is high-level in three frames of the remainder. In one frame which is this low level, as shown in drawing 14 (3), only a fixed distance which corresponded to one frame from the original position 66 and which is defined beforehand moves a character 12. In this way, when the press force is the 1st range, for example, it is less than 1-100g, the traverse speed of a character 12 is a low. When it is 100g or more and less than 200g and the 2nd range of digital value is 33-64, as shown in drawing 15 (4), the 1st operation means 17 a data signal As it is a low level with two frames, a high-level signal is drawn with two residual frames and it is shown to drawing 14 (4) by this In the period of the frame which is a low level, a character 12 moves

through a position 67, therefore traverse speed turns into a high speed compared with drawing 14 (3) and drawing 15 (3).

[0105]

The 1st alter operation means 17 if it is operated by the press force (300g or more and less than 400g), for example, the digital value corresponding to the press force A data signal is a low level with three frames, as shown in drawing 15 (5), at this time, it is the 3rd range of 65-96, it becomes high-level with one residual frame, and as shown in drawing 14 (5), the original position 66 moves a character 12 through positions 67 and 68. Furthermore, if it is judged that it is operated by the large press force 400g or more, and the 5th range of digital value is 97-127, the 1st alter operation means 17 The data signal which is a low level is drawn over all four frames that are one unit as shown in drawing 15 (6). By this, for every frame, a character 12 moves through positions 67, 68, and 69 from the original position 66, as shown in drawing 14 (6), and it becomes high-speed.

It does in this way, and according to the press force of the 1st alter operation means 17, in the 2nd range - the 5th range, 1 time, 2 times, 3 times, and all frames will be covered at four frames, and the data signal from which a logical value changes [the data signal corresponding to the right key 47] with time progress serially will be drawn. This is the same also about other keys 48-50.

In this way, compared with the time of operating the digital formula push-button in conventional alter operation equipment, the press force is controlled by this design, as shown in drawing 14 (2), traverse speed of a character 12 can be made small and can be adjusted now, and the interest of a game can be increased.

[0106]

the [the 1st and] -- 2 alter operation meanses 17; -- after changing into digital value the 1st and 2nd detecting signals which have the level depending on the press force of 18 and 19 by the analog-to-digital converter 23, it is also possible to judge the digital value in the two ranges of binary [of ON/OFF], and to use it as a digital formula push-button by carrying out level discrimination with the value defined beforehand

[0107]

further -- the [the 1st and] -- 2 alter operation meanses 17; -- by operating 18 and 19, as shown in drawing 16 (1), it is also possible to move the character 12 in Screen 11, as the curved smooth tracing 71 is followed as show in drawing 16 (2) of an advanced technology, the character 12 in Screen 11 can only perform follow the tracing 72 on the curve which moved four directions and aslant [45] the combination of the tracing 72 on a curve, i.e., by carry out 2 press operations of the push-button the right, the left, above, and down individually or simultaneous, by operate the push-button of the digital formula which show a direction. This design solves this problem and it enables a character 12 to follow the smooth tracing 71 of above-mentioned drawing 16 (1).

[0108]

Drawing 17 is drawing for explaining operation for a character 12 following the smooth tracing 71 shown in drawing 16 (1). It is drawing 17 (1) about the 1st alter operation means 17.

When it is alike, and moving the position pushed smoothly as shown to a key 47 by the arrow mark 75 covering positions 73-74 from a key 49 so that it may be shown, the level of the detecting signal showing the electric resistance corresponding to the press force of each class 27-30 of an electrode changes. As shown in drawing 17 (2), according to composition of these vectors A2 and B-2, the slanting vector C2 can be acquired with the level of the detecting signal from each class 29 and 27 corresponding to rightward vector B-2 by the upward vector A2 by the key 49, and the key 47, respectively.

[0109]

$A2+B-2 = C2$ -- (3)

Therefore, if press operation of the keys 49 and 47 is carried out simultaneously, tracing of a character 12 will become slanting corresponding to a vector C2. The inclination of this vector C2 changes with the vector ratios of the upward vector A2 and rightward vector B-2 in every direction.

Therefore, the inclination of the synthetic vector C2 can be smoothly expressed according to the press force of keys 49 and 47. Therefore, as shown in drawing 17 (3), the actual tracing 76 of a character 12 can be obtained almost in accordance with the tracing 77 of the request made into an ideal for every unit distance of division, such as every direction 12 or 128.

[0110]

On the other hand, in the advanced technology, since the digital formula push-button is used, the tracing 78 of an actual character shifts from the tracing 77 of the request made into an ideal greatly, and becomes the combination of each tracing 96 and 97 of above and the right, and the tracing 98 of 45 slant. In this way, about this design, a character 12 can follow the actual tracing 76 approximated very much on the tracing 77 of an ideal, and it can be moved now to it.

[0111]

Drawing 18 shows Screen 11 when performing a shooting game by the three-dimension-operation technique in other gestalten of operation of this design. A fighter 85 can move to top 81, bottom 82, the left 83, and the right 84, and it can be made to move the back and before Screen 11 further. the [for this reason,] -- 1 alter operation means 17 operates it -- having -- the further above-mentioned three-dimension-operation technique -- movement of the view of depth -- it can carry out -- further -- the [the 1st or] -- 2 alter operation means 17; -- the acceleration of a fighter 85 can be smoothly changed by the strength of the press force of 18 and 19

[0112]

Drawing 19 shows Screen 11 when performing a racing game using the three-dimension-operation technique in other gestalten of operation of this design. It can change smoothly, the end angle, i.e., the steering angle, of a handle of an automobile 86 which is a character, and the move direction 87 can be controlled by operation of the 1st alter operation means 17. Furthermore, the 2nd alter operation means 18 and 19 can be individually responded to an accelerator pedal and a brake pedal, and the acceleration of an automobile 86 can be moved according to an operator's natural feeling.

[0113]

Drawing 20 is drawing for explaining change of the display mode of the character 12 in the form of further others of operation of this design. The data signal which moves the 2nd alter operation means 18 in the direction of Z-axis + with acceleration a by carrying out press operation in drawing 20 (1) shall be generated, and the data signal slowed down by braking operation shall be generated by operating the 3rd alter operation means 20. When the cube-like character 12 is moving in the direction of Z-axis + with acceleration a by press operation of the 2nd alter operation means 18, If it pushed further, with the press operation of the 2nd alter operation means 18 carried out as the 3rd alter operation means 20 of a digital formula was shown in drawing 20 (2), in the central-process circuit 24 the [these 2nd / the / and] -- the 2nd and 3rd detecting signals of 3 alter-operation means 18 and 20 will be answered, the correlation will be searched for, and the data signal from which the move direction of a character 12 turns into the direction of Z-axis - will be created

[0114]

Drawing 21 is drawing for explaining change of the display mode of the form of further others of operation of this design. When games are fighting games, such as boxing, adjustment control of the angle covering all the directions of a character 88 can be carried out by operation of the 1st alter operation means 17, and the press force can adjust the traverse speed of a direction. Furthermore depending on the press force of the 2nd alter operation means 18 and 19, the strength of punch of a character 88 is adjusted. According to it, a character 89 responds to the strength of the punch. A part of character 89 For example, it becomes possible to be able to move, as a trunk is shown by the reference mark 90, to be able to express the strength of punch according to the movement magnitude, therefore to adjust the time rate of change of change of a character 89 by the press force of the 2nd alter operation means 18 and 19.

[0115]

Drawing 22 is drawing for explaining the change of the display mode of the screen [in / a fighting game /

for example] 11 in the form of further others of operation of this design. In the fighting game, a weak kick is performed like the leg 92 of the leg which is a part of character 91 which carried out human being's configuration. When a leg 93 carries out rise displacement further, a degree is kicked in the middle, as shown by drawing 22 (2), a leg 94 carries out rise displacement still like drawing 22 (3) and a strong kick is performed the [the 1st or] -- 2 alter operation meanses 17; -- the press force of 18 and 19 is changed and a strong kick is made to correspond to the large state from the small state of the press force from a weak kick It can be made to be able to attack by the ability displaying the grade of the kick according to an operator's unconscious feeling, and can be made to correspond to an operator's intention by this.

[0116]

the [at the time of drawing 23 being the flow chart of other forms of operation of this design for explaining operation of the central-process circuit 24 in alter operation equipment 9, and operation of this drawing 23 being performed, as for drawing 24 / the 1st or] -- 2 alter operation meanses 17; -- it is the wave form chart of the 1st obtained from 18 and 19, or 2nd detecting signal The 1st or 2nd detecting signal shown in drawing 24 corresponds to the digital value which corresponded to the digital value changed by the analog-to-digital converter 23, or the digital value mentioned above in relation to drawing 11 and by which data processing was carried out. When the level of the 1st detecting signal changes like a line 101 when press operation is carried out so that it may strike, on the other hand press operation is slowly carried out, for example in the key 47 of the operating member 35 in the 1st alter operation means 17, the wave of a line 102 is acquired.

[0117]

In Step U1 of drawing 23 , the time of press operation being carried out so that the key 47 of the operating member 35 of the 1st alter operation means 17 may strike-is assumed. the 1st whose central-process circuit 24 is the interrupt signal demand level to which the partial pressure voltage from an output terminal 54 was set beforehand at Step U2 -- it is the time t1 which became more than discrimination level V1, and interrupt operation is performed Step U3 -- this 1st detecting signal -- the 1st -- after becoming more than discrimination level V1, at Step U4, the partial pressure voltage V01 outputted to an output terminal 54 is incorporated waiting and after that to the time t2 in which the 1st defined beforehand carries out time W1 (for example, 1ms) progress At the following step U5, level discrimination of the partial pressure voltage V01 is carried out on the 2nd discrimination level Vt1, if the partial pressure voltage V01 is $V01 \geq Vt1$, in Step U6, it will be judged as that by which press operation was carried out so that operating member 35 may strike in a key 47, and the data signal for which the main part 6 of a game machine asks corresponding to the operation will be generated and derived by data processing. The 2nd discrimination level Vt1 is set to the value exceeding the 1st discrimination level V1.

[0118]

When press operation of the operating member 35 in the 1st alter operation means 17 is slowly carried out in a key 47, Steps U1-U5 of drawing 23 are performed almost similarly.

Level discrimination of the partial pressure voltage V02 in time t2a in which the 1st beforehand defined from time t1a of the 1st discrimination level V1 whose partial pressure voltage outputted from an output terminal 54 is interrupt signal demand level passed time W1 is carried out on the 2nd discrimination level Vt1. If it is judged at Step U5 that it is $V02 < Vt1$, it will move to Step U7. The data signal for which judges it as that by which press operation of the key 47 of operating member 35 was carried out slowly, and performs the usual analog processing, or the main part 6 of a game machine asks is generated and derived by data processing.

[0119]

Drawing 25 is the wave form chart of the 1st detecting signal which is the partial pressure voltage obtained from the output terminal 54 when separating a finger from the state which carried out press operation of the key 47 of the operating member 35 in the 1st alter operation means 17, for example. This

partial pressure voltage corresponds to the signal after data processing which corresponded to the digital value obtained from an analog-to-digital converter 23, or was mentioned above in relation to drawing 11. When the finger of a hand is suddenly lifted from the operating member 35 in a key 47 in instant, the wave of a line 103 is acquired, and when it detaches slowly to this, the wave of a line 104 is acquired.

[0120]

the 3rd which it moves from the central-process circuit 24 to Step U2 from Step U1 of drawing 23, and is the interrupt signal demand level of the central-process circuit 24 about partial pressure voltage when a line 103 is obtained -- the time t_3 which became less than [discrimination level V_2] is detected, and the partial-pressure voltage V_{04} of the output terminal 54 in the time t_4 in which the 2nd beforehand defined from the time t_3 carried out time W_2 (for example, 1ms) progress is incorporated at Step U Level discrimination of the partial pressure voltage V_{04} is carried out on the 4th discrimination level V_{t2} , and at Step U5, if it is $V_{04} \leq V_{t2}$, it is judged as that from which the finger of a hand was suddenly lifted by the key 47, and by Step U6, operating member 35 will carry out data processing of the data signal for which the main part 6 of a game machine asks by this, will generate it, and will derive it.

[0121]

When the finger of a hand is slowly lifted from operating member 35 so that a line 104 may be obtained, the partial pressure voltage V_{03} of time t_{4a} after the 2nd time W_2 progress defined beforehand is similarly obtained from time t_{3a} from which the partial pressure voltage became less than [interrupt signal demand level V_2] at Step U4. At Step U5, if it is judged that it is $V_{03} > V_{t2}$, it will be judged as that by which the finger of a hand was slowly lifted from operating member 35 in Step U7, and the data signal for which the usual analog processing or the main part of a game machine asks will be generated and derived by data processing. the 4th discrimination level V_{t2} -- the 3rd -- it is set to less than [discrimination level V_2] Although it gives above-mentioned explanation in relation to the key 47 of the 1st alter operation means 17, others reach key 48-50, and it is the same also about the 2nd alter operation meanses 18 and 19.

[0122]

Drawing 26 shows the data stream of the data signal drawn from the processing means 16 by the flexible line 8 in one form of operation of this design relevant to above-mentioned drawing 23 and above-mentioned drawing 24. The partial pressure voltage in the 1st alter operation means 17 which reaches key 47-50 and is obtained by operation of the 2nd alter operation meanses 18 and 19 is more than interrupt signal demand level V_1 , and the data stream of drawing 26 (1) means whether press operation was carried out. These reach key 47-50, each bit position of a data stream corresponds to the 2nd alter operation meanses 18 and 19, and if press operation is carried out, logic "1" is generated, and logic "0" will be drawn if press operation is not carried out. In drawing 26 (1), the logical value by the 2nd alter operation meanses 18 and 19 is shown in the bit position of reference marks A and B, a still more nearly additional analog formula alter operation means is established, and bit-position C-L is prepared again corresponding to the 3rd alter operation meanses 20 and 21 etc.

[0123]

Following on the data stream of drawing 26 (1), the data signal which consists of another data stream further shown in drawing 26 (2) is drawn from the central-process circuit 24. the [whether in the data stream shown in this drawing 26 (2), the operating member / in / the 1st alter operation means 17 / especially / each bit position is the same as that of the bit position of the data stream of above-mentioned drawing 26 (1), and] 35 is the one or more 2nd discrimination level / in / drawing 24 / on each keys 47-50 and] V_t , and / -- according to whether it is less than one 2 discrimination level V_t , logic "1" and logic "0" are generated, respectively This is the same also about the 2nd alter operation meanses 18 and 19, and still the more nearly same also about other additional analog formula alter operation meanses. Therefore, it is used for data processing of the game in the main part 6 of a game machine by deriving the data signal which consists of each data stream of drawing 26 (1) and drawing 26 (2) from the processing means 16 for every frame on the main part 6 of a game machine synchronizing with a synchronizing

signal. The data signal described in relation to drawing 25 further again is also given to the main part 6 of a game machine by the data stream shown in drawing 26 , and the same data stream.

[0124]

Drawing 27 is drawing showing the state where data processing of a game is performed with a microcomputer 15 by the alter operation mentioned above in relation to drawing 23 in the main part 6 of a game machine - drawing 26 , and it is displayed on Screen 11. Slowly so to speak, the key 47 of the operating member 35 in the 1st alter operation means 17 is a weak touch like the line 102 of drawing 24 , therefore when press operation is carried out by the small time rate of change of the press force, by constant speed, it rolls rightward and a microcomputer 15 moves the character 12 of Screen 11, for example, as shown to the method of the right by the reference mark 105,106.

[0125]

As it is a strong touch so to speak, therefore it is shown to the line 101 of above-mentioned drawing 24 by big time rate of change, and it struck, when press operation of the key 47 of operating member 35 is carried out, as shown in drawing 27 (2), avoiding and jumping the obstruction 107 over the obstruction 107 in the screen 11, it rolls rightward and a character 12 is moved. the [thus, / the 1st and] -- 2 alter operation meanses 17; -- changing the press operating speed of 18 and 19 -- change of a character 12 or the display mode of a background -- varieties -- it can carry out

[0126]

Drawing 28 is the plan which the 1st alter operation means 17 of each of other gestalt of operation of this design simplified. The operating member 111 which replaces with the above-mentioned operating member 35 and 45, and is shown in drawing 28 (1) may be formed in the shape of a cross joint, and it may be formed in a square like the operating member 112 of drawing 28 (2), or may be formed in a right octagon like the operating member 113 of drawing 28 (3) again, and although such operating member 35 and 45,111,112,113 may be configurations symmetrical with a point, they may be other configurations.

[0127]

Drawing 29 is the plan showing each class 114-117 of the electrode of the 1st alter operation means 17 in other forms of operation of this design. Although each class 114-117 of an electrode is the same as that of the form of the operation as which being opened, arranged and formed described the interval of 90 degrees to the hoop direction in relation to above-mentioned drawing 4 on the closed loop of a perfect circle Compared with the form of operation of the drawing 4 , it has shifted to the hoop direction 45 degrees, two groups 114,115 are used for rightward detection, and the group 114,117 of an electrode is already for above detection. Such composition is also included in this design.

[0128]

Drawing 30 is drawing of longitudinal section which the 1st alter operation means 17 of the form of further others of operation of this design simplified. The bowl-like operating member 118 is supported with two or more rollers 119, such as disc-like [which was prepared in the hoop direction centering on an axis 38], or a sphere. With an encoder, a detecting signal is drawn and the rotation and angle of rotation of a roller 119 can detect all the directions of the actuated valve position of operating member 118 in this way. The press force still more nearly parallel to the axis 38 of operating member 118 etc. is detectable with the press force detection means 120.

[0129]

With other forms of operation of this design, the composition which detects the press force by the support salient 37 of operating member 35 may be arranged on a substrate 26, and the composition may be the same as the pressure-sensitive part material 32 and the composition which uses Electrodes 27a and 27b.

[0130]

Drawing 31 is the cross section of the 2nd alter operation means 18, drawing 32 is the plan which the 2nd alter operation means 18 simplified, and drawing 33 is the electrical diagram showing the connection state of the 2nd alter operation means 18 shown in drawing 31 and drawing 32 . In these drawings, the same reference mark is given to the component to which the above-mentioned 1st alter

operation means 17 corresponds. The pressure-sensitive part material 32 is arranged over an electrode 122a [of the couple of the group 122 formed on the wiring substrate 26], and 122b top, the rigid operating member 35 is arranged through shock absorbing material 40 on the pressure-sensitive part material 32, the outward flange 41 is pressed down with housing 22, and the pressure-sensitive part material 32 is in the state where it was compressed beforehand. it should observe -- with the form of implementation of this design, fixed resistance 123 is formed in the wiring substrate 26, this fixed resistance 123 is connected to electrode 122b through the line 124 formed on the wiring substrate 26, and a series circuit is formed This series circuit is connected to the one side terminal Vcc of DC power supply in fixed resistance 123, and electrode 122a is grounded by common potential.

A line 124 is connected to an output terminal 125, and the 2nd detecting signal is drawn. The level of the 2nd detecting signal from this output terminal 125 is the partial pressure voltage by the electric resistance and fixed resistance 123 between electrode 122a of the couple depending on the press force of the pressure-sensitive part material 32 by operating member 35, and 122b.

[0131]

Drawing 34 is the cross section of the 2nd alter operation means 18 in other forms of operation of this design, drawing 35 is the plan which the 2nd alter operation means 18 shown in drawing 34 simplified, and drawing 36 is an electrical diagram explaining the connection state of the 2nd alter operation means 18 shown in drawing 34 and drawing 35 . The form of this operation is also similar to the composition of the 2nd alter operation means 18 shown in the above-mentioned 1st alter operation means 17 and above-mentioned drawing 31 - drawing 33 , and gives the same reference mark to a corresponding portion. it should observe -- with the form of this operation, the electrodes 126a and 126b of the couple of another group 126 other than a group 122 are formed in the wiring substrate 26, and the pressure-sensitive part material 32 is further arranged at it over each electrode 122a of these each class 122,126, 122b;126a, and 126b Right above [of the aforementioned group 122], press operation of the pressure-sensitive part material 32 is carried out through shock absorbing material 40 from operating member 35. Electrode 122b and electrode 126a are connected through a line 127, a series circuit is constituted, electrode 126b in this series circuit is connected to one terminal Vcc of DC power supply, and electrode 122a is grounded by common potential. The partial pressure voltage from a line 127 is drawn from an output terminal 128 as the 2nd detecting signal.

[0132]

In order that the electric resistance of the pressure-sensitive part material 32 between electrode 126a and 126b may obtain partial pressure voltage from an output terminal 128, so to speak, the work as fixed resistance of a dummy is achieved. You may prepare the member for pressing the pressure-sensitive part material 32 in right above [of the aforementioned group 126] by the fixed pressure to those electrodes 126a and 126b. Other composition is the same as that of the form of above-mentioned operation.

[0133]

With the form of operation shown in drawing 34 - drawing 36 , the pressure-sensitive part material 32 is formed in common over each class 122,126. And since it has the composition that the partial pressure voltage by the electric resistance by the pressure-sensitive part material 32 in each class 122,126 is drawn from the output terminal 128 The outstanding effect of preventing partial pressure voltage's changing a lot depending on the property of the pressure-sensitive part material 32, and dispersion arising the same with having mentioned above in relation to the 1st alter operation means 17 is attained.

[0134]

Another 2nd alter operation means 19 as well as the 2nd alter operation means 18 may be constituted. Each keys 47-50 of the 1st alter operation means 17 may also have the same composition as the above-mentioned 2nd alter operation means 18, respectively. Furthermore, the 3rd alter operation meanses 20 and 21 as well as the 2nd alter operation meanses 18 and 19 are constituted, and you may have detection equipment which makes binary digital value which carried out analog-to-digital conversion of the 2nd detecting signal, and obtained it on one discrimination level.

[0135]

[Effect of the Device]

Data processing of a series of performance information of the change of acceleration of the display mode of the character or background which was carrying out data processing with the microcomputer with which the main part of a game machine is equipped in the former according to this design of a claim 2 and claims 3 and 4, for example, the amount, movement magnitude, and a character etc. is carried out with the processing means with which alter operation equipment is equipped about this design, and it is a data signal.

Since it was made to *****, the burden of information processing of the microcomputer with which the main part of a game machine is equipped can decrease, the part and other data processing can be performed now, and the so-called speedup of a game is much more attained by this.

[0136]

Furthermore, according to this design of claims 2 and 4, a processing means By giving the indication signal showing data processing of a required kind from the main part of a game machine, further in a claim 4 Since data processing, such as carrying out level discrimination of the 1st and 2nd detecting signals, is performed and the data signal was derived, data-processing operation of the processing means in the alter operation equipment It will be carried out as required, and useless operation is lost, the part and a required operation throughput are made [many], and it becomes further much more possible to mitigate the burden of the microcomputer with which the main part of a game machine is equipped by this.

[0137]

Furthermore, according to this design, a processing means creates and draws a data signal by the data stream which suited the communication format of the main part of a game machine, namely, derives a data signal by the serial bit.

[0138]

the [for obtaining the 1st or 2nd detecting signal according to this design of claims 1 and 5 / the 1st or] -- 2 alter operation meanses attain the miniaturization of composition, and become easy to solve the problem of scramble of an attachment place while they have the level corresponding to the press force operated by hands, such as a finger, and its operability improves by this the [in / a claim 5 / to the detection equipment row of a claim 1 / the 1st and] -- with 2 alter operation meanses, including the composition which carries out press operation of the below-mentioned pressure-sensitive part material directly, for example by hands, such as a finger, includes the composition which carries out press operation of the pressure-sensitive part material etc., and, of course, derives the 1st or 2nd detecting signal over 360 degrees with the joy stick which can be rocked further, for example

[0139]

When the grade of excitement of the operator who enjoys a game becomes intense, this press force becomes large, therefore is the 1st and 2nd detecting signals as it is about an operator's feeling and a feeling.

It can derive as ** level and the interest of a game machine will improve further. Composition for the alter operation which uses such press force for the advanced technology is not realized.

[0140]

Since according to this design of a claim 6 the electrode of a couple was prepared on the wiring substrate and pressure-sensitive part material has been arranged on it, composition is simplified and miniaturized, moreover productivity is excellent, and it realizes cheaply.

[0141]

according to this design of a claim 7 -- pressure-sensitive part material -- single -- since it is one sheet and the partial pressure voltage from inter-electrode [of two or more each class] was obtained -- the [the 1st or] -- dispersion in the property for every product of 2 alter operation meanses can be abolished, and the influence of a solid-state difference can be small suppressed now

Moreover, partial pressure voltage can be enlarged comparatively and an SN ratio having no amplifier and good can be obtained.

[0142]

According to this design of a claim 8, with a 1st alter operation means by which all the directions of a press actuated valve position can be shown, two or more three or more each class is accomplished, an electrode can be arranged, dispersion in the property for every product can be abolished, the partial pressure voltage corresponding to the inter-electrode electric resistance of each class can be obtained, and all the directions can be detected.

[0143]

According to this design of claims 9 and 13, to pressure-sensitive part material Also in the state where press operation is not carried out, apply the fixed pressure beforehand, and it prevents changing sharply the level of the 1st or 2nd detecting signal according to the press force operated by this. The 1st or 2nd detecting signal which has the stable level which corresponded to the press force correctly can be obtained now, and operability when performing the game will improve.

[0144]

According to this design of a claim 10, the closed loop on the imagination by which each class of an electrode is arranged For example, since it has the configuration of point symmetries, such as a perfect circle, 2 sets of electrodes in the position of a point symmetry form a series circuit and it is operated by the rigid operating member which pressure-sensitive part material can rock freely When press operation of one group is carried out among 2 sets of electrodes in the position of a point symmetry as well as all the directions of the position by which press operation is carried out being detectable, In order to be able to use resistance of the pressure-sensitive part material covering the electrode on which the press force does not act on the group of another side, and the compressive force does not act in order to obtain partial pressure voltage, therefore to obtain partial pressure voltage, it is not necessary to prepare fixed resistance and simplification of composition can be attained separately.

[0145]

Since it considers as a rockable around the support salient formed in rigid operating member according to this design of a claim 11, in the group of aforementioned another side by which press operation is not carried out among 2 sets of electrodes in the position of a point symmetry, the press force can be prevented from acting certainly and can detect the direction of a press actuated valve position correctly with partial pressure partial pressure voltage, therefore partial pressure voltage. And since the formed press side is formed in operating member, in a press position, the 1st detecting signal which stress with pressure-sensitive part material uniform from the point of symmetry to the radiation direction will act, therefore has the stable level corresponding to the press force can be obtained.

[0146]

According to this design of a claim 12, since it is divided by the hoop direction of a closed loop 31 and is moreover arranged in right above [of each class 27-30], shock absorbing material 40 can obtain the 1st detecting signal which expresses correctly the position of the middle by which press operation was carried out in the middle position of each class 27-30 by carrying out press operation of the operating member 35 between a group 29 and a group 28. It becomes possible correctly to obtain the 1st detecting signal which expresses correctly the operation condition of the operator who enjoys a game, and to change the character in a screen, and the display mode of a background by this.

[0147]

since according to this design of a claim 14 the level of the 1st or 2nd detecting signal is changed into digital value so that it may become the primary value of a function of operation physical quantity, such as press force or a control input, -- the [the 1st or] -- irrespective of various kinds of properties of 2 alter operation meanses, data processing in a processing means can be correctly performed now smoothly, and data processing becomes easy

[0148]

Since data processing with comparatively much number of steps is performed with a processing means while being able to improve the interest of a game, since according to this design of a claim 15 level discrimination is carried out in quest of the speed of change of the digital value of the 1st or 2nd detecting signal and two or more ranges were judged, the burden of information processing of the microcomputer in the main part of a game machine does not increase.

[0149]

According to this design of claims 16 and 17, positive [of the 1st or 2nd detecting signal] or the speed of a negative change can be calculated and found, and the burden of the microcomputer in the main part of a game machine etc. can be mitigated.

[0150]

By carrying out level discrimination of the value to which digital conversion of the 1st or 2nd detecting signal was carried out on one discrimination level according to this design of a claim 18 By carrying out level discrimination on discrimination level which can obtain as a binary signal or is different in mutual [two or more] again, the number of the push buttons individually formed according to the strength of the former, for example, punch, can be reduced, moreover the signal of a multi-stage story can be acquired, and the miniaturization of composition is attained easily.

[0151]

The data signal corresponding to the combination correlation with the 3rd detecting signal which is the level of the 1st and 2nd detecting signals of an analog formula, and binary [of a digital formula] according to this design of a claim 19

It can ***** and the character of a screen or the display mode of a background can be changed now to varieties.

[0152]

the mode of change of a character [in / a screen / according to this design of a claim 20, corresponding to the level of the 1st or 2nd detecting signal, a data signal is generated serially, and / by this], or a background -- varieties -- it can realize and the interest of a game can be improved

[0153]

According to this design of a claim 21, a serial data signal is drawn synchronizing with each frame of a screen, and can attain change of the display mode by which the character in a screen or the background was stabilized.

[0154]

According to this design of a claim 22, in order to derive the 1st or 2nd detecting signal corresponding to the press force of the inter-electrode pressure-sensitive part material of a couple, fixed resistance is prepared on the wiring substrate in which those electrodes were formed, by this, assembly operation can be made easy and the miniaturization of composition can be attained. Especially this is an important thing in the alter operation equipment with which an operator holds and operates it by the palm, therefore a miniaturization is demanded.

[0155]

The operation in the claims 1-14 of this design not only carries out press operation for example, of the pressure-sensitive part material directly by hands, such as an operator's finger, but Carry out press operation through the operating member 35 in the form of the above-mentioned operation, and it continues for 360 more degrees. Or press operation of the pressure-sensitive part material is carried out with joy sticks, such as a stick rocked to the circumference of 1 axis, or a lever. Instead of furthermore using pressure-sensitive part material, the composition which changes into an electrical signal the variation rate by operation of detecting-element-ed material in which the spring force is given, and obtains the above 1st and the 2nd detecting signal with a spring is included. . . .

[Filing Date] March 31, Heisei 9 [the procedure amendment 2]

[Document to be Amended] Specification [the subject name for an amendment] 0014 -- [Method of Amendment] Change [the content of an amendment]

[0014]

[Means for Solving the Problem]

This design is alter operation equipment for home video game machines which changes a character or the display mode of a background. This alter operation equipment It has the 1st, the 2nd, and 3rd alter operation means. The 1st alter operation means The 1st detecting signal which has the 1st pressurization means for showing all the directions of the position of operation, consisted of two or more 1st detection equipments of an analog formula from which an electrical property changes with the press force by the 1st pressurization means, and was detected from the 1st detection equipment

It *****. The 2nd alter operation means has a 2nd pressurization means to show the direction of the shape of a straight line. It consists of the 2nd detection equipment of an analog formula from which an electrical property changes with the press force by the 2nd pressurization means. The 2nd detecting signal detected from the 2nd detection equipment is drawn. The 3rd alter operation means Consisting of the 3rd detection equipment which detects the state where it is not operated, and an operation state, the 3rd detection equipment draws binary level. The alter operation equipment for these home use video game machines Further A detecting-signal processing means to generate the data signal showing a series of performance information for acquiring the 1st, the 2nd, and 3rd detecting signals through an interface, and operating a character or a background, It is alter operation equipment for home video game machines characterized by having the means of communications which derives a data signal on the main part of game machine.

Moreover, this invention is characterized by for a detecting-signal processing means carrying out analog-to-digital conversion of the 1st or 2nd detecting signal, and acquiring it.

[Procedure amendment 3]

[Document to be Amended] Specification [the subject name for an amendment] 0024 -- [Method of Amendment] Change [the content of an amendment]

[0024]

Furthermore, it cannot say that the processing means is always performing much data processing, but only data processing which an indication signal directs can be performed like claims 2 and 5, and useless data processing cannot be performed, but time to obtain the result of an operation by this can be shortened.

[Procedure amendment 4]

[Document to be Amended] Specification [the subject name for an amendment] 0025 -- [Method of Amendment] Change [the content of an amendment]

[0025]

The data-processing means with which the processing means in a claim 4 is equipped includes the composition which performs each data processing, such as the utility model registration claim claims 15-22 shown above, or the composition which performs other data processing. Making a multiple-times judgment of to which range the value which carried out analog-to-digital conversion is belonged includes opening a time interval, carrying out analog-to-digital conversion twice or more, and performing data processing, in order to find the operated speed like the utility model registration claim claims 16-18 shown above.

[Procedure amendment 5]

[Document to be Amended] Specification [the subject name for an amendment] 0026 -- [Method of Amendment] Change [the content of an amendment]

[0026]

The processing means of a claim 4 judges the data-processing means for which the main part of a game machine asks, this data-processing means to want may be a data-processing means specified by the indication signal from the microcomputer of the main part of a game machine, or it includes the composition which the data-processing means is switched [composition] and operates it by the circuit changing switch operated by the operator with whom this alter operation equipment is equipped.

[Procedure amendment 6]

[Document to be Amended] Specification [the subject name for an amendment] 0027 -- [Method of Amendment] Change [the content of an amendment]

[0027]

When a character is a human body, change of the character in claims 1 and 5 or the display mode of a background includes at least the thing of a character or a background which a part, for example, the truncus, or membrum inferius of the human body etc. carries out movement etc., and is changed in part, while including that movement of the character itself or the background itself etc. changes by carrying out.

[Procedure amendment 7]

[Document to be Amended] Specification [the subject name for an amendment] 0028 -- [Method of Amendment] Change [the content of an amendment]

[0028]

The indication signal in claims 2 and 5 may be a signal showing the command which is an instruction, or you may be a signal showing the program which performs data processing given to the detecting-signal processing means of a claim 1, or the processing means of claims 4 and 5 from the main part of a game machine, and the aforementioned detecting-signal processing means or the aforementioned processing means performs data processing according to this program.

[Procedure amendment 8]

[Document to be Amended] Specification [the subject name for an amendment] 0029 -- [Method of Amendment] Change [the content of an amendment]

[0029]

This processing means corresponds to the content of data processing for which the indication signal transmitted from the microcomputer with which the main part of a game machine is equipped asks. The signal by the interface which carried out analog-to-digital conversion the 1st and 2nd detecting signals Or for example, the signal which carried out data processing like claims 15-18 corresponding to the indication signal The data signal by which made a multiple-times judgment and data processing was carried out [to which range it belongs to 1 or two or more discrimination level which were set up beforehand, and] corresponding to 1 time or the range by which a judgment was made [aforementioned] is generated by the data stream which suited the communication format of the main part of a game machine, and it derives on the main part of a game machine.

[Procedure amendment 9]

[Document to be Amended] Specification [the subject name for an amendment] 0030 -- [Method of Amendment] Change [the content of an amendment]

[0030]

If this design is followed, level discrimination is carried out, the signal which the processing means carried out level discrimination of the signal with which analog-to-digital conversion of the 1st and 2nd detecting signals was carried out as it was, and judged the range, or carried out data processing of the signal by which analog-to-digital conversion was carried out corresponding to the indication signal from the main part of a game machine is judged, and this data processing includes other data processing in the utility model registration claim claim 15 shown above and claims 16, 17, and 18, and a row. Furthermore corresponding to the judged aforementioned range, data processing of the data signal is carried out. It is created and drawn by the data stream which suited the communication format from the main part of a game machine, and this data signal by which data processing was carried out You may be a signal showing the range by which a judgment was made [aforementioned], may be the signal created so that it might become a data stream, or may be the data signal in which others carried out data processing to the range claim 19 and claim 20 row of a utility model registration claim shown above.

[Procedure amendment 10]

[Document to be Amended] Specification [the subject name for an amendment] 0033 -- [Method of

Amendment] Change [the content of an amendment]

[0033]

the [in claims 1, 4, and 5 / the 1st and] -- 2 alter-operation meanses may be the composition using the composition which used magnetic sensing elements, such as an OPUTO encoder or an optical rotary encoder, a trackball, a joy stick, and a hall device, the optical joy stick, the variable resistor, etc., or may be the composition that electrostatic capacity changes with operations, and may be composition which derives the electrical signal which has the level which changes with the press force of the hand described further below

[Procedure amendment 11]

[Document to be Amended] Specification [the subject name for an amendment] 0034 -- [Method of Amendment] Change [the content of an amendment]

[0034]

if this design of claims 1 and 6 is followed -- the [the 1st or] -- the 1st or 2nd detecting signal which has the level corresponding to the press force operated with the finger of an operator's hand etc. by analog operation by 2 alter operation meanses is derived That is, the 1st or 2nd detecting signal is an electrical signal which has the level corresponding to the press force by the hand containing an operator's finger etc. this -- the [the 1st or] -- it is easy to be able to attain the miniaturization of the composition of 2 alter operation meanses, and to solve the problem of scramble of the place of the outside surface of housing in alter operation equipment, and operability is still better

[Procedure amendment 12]

[Document to be Amended] Specification [the subject name for an amendment] 0037 -- [Method of Amendment] Change [the content of an amendment]

[0037]

In claims 6 and 7 the 1st or 2nd detecting signal In order to obtain the 1st or 2nd detecting signal which has the level corresponding to the press force operated, and has the level corresponding to this press force You may make it use pressure-sensitive part material. such pressure-sensitive part material The press force of an operator's hand may be constituted so that it may act directly from operating member 35 in the gestalt of the below-mentioned operation. You may be the composition which the operating member 35 is omitted and carries out press operation of the front face of the pressure-sensitive part material 32 directly with an operator's finger etc. or with other gestalten of operation of this design, further The composition which presses pressure-sensitive part material is included by joy sticks, such as a stick or a lever, or the member which moves.

[Procedure amendment 13]

[Document to be Amended] Specification [the subject name for an amendment] 0135 -- [Method of Amendment] Change [the content of an amendment]

[0135]

[Effect of the Device]

Change of the display mode of the character or background which was carrying out data processing with the microcomputer with which the main part of a game machine is equipped in the former according to this design of claims 2 and 3 and claims 4 and 5, For example, since data processing of a series of performance information of the amount of acceleration, movement magnitude, and a character etc. is carried out with the processing means with which alter operation equipment is equipped about this design and the data signal was generated The burden of information processing of the microcomputer with which the main part of a game machine is equipped can decrease, the part and other data processing can be performed now, and the so-called speedup of a game is much more attained by this.

[Procedure amendment 14]

[Document to be Amended] Specification [the subject name for an amendment] 0136 -- [Method of Amendment] Change [the contents of an amendment]

[0136]

Furthermore, according to this design of claims 2, 3, and 5, a processing means By giving the indication signal showing data processing of a required kind from the main part of a game machine, further in a claim 5 Since data processing, such as carrying out level discrimination of the 1st and 2nd detecting signals, is performed and the data signal was derived, data-processing operation of the processing means in the alter operation equipment It will be carried out as required, and useless operation is lost, the part and a required operation throughput are made [many], and it becomes further much more possible to mitigate the burden of the microcomputer with which the main part of a game machine is equipped by this.

[Procedure amendment 15]

[Document to be Amended] Specification [the subject name for an amendment] 0138 -- [Method of Amendment] Change [the contents of an amendment]

[0138]

the [for obtaining the 1st or 2nd detecting signal according to this design of claims 1 and 6 / the 1st or] -- 2 alter operation meanses attain the miniaturization of composition, and become easy to solve the problem of scramble of an attachment place while they have the level corresponding to the press force operated by hands, such as a finger, and its operability improves by this the [in / a claim 6 / to the detection equipment row of a claim 1 / the 1st and] -- with 2 alter operation meanses, including the composition which carries out press operation of the below-mentioned pressure-sensitive part material directly, for example by hands, such as a finger, includes the composition which carries out press operation of the pressure-sensitive part material etc., and, of course, derives the 1st or 2nd detecting signal over 360 degrees with the joy stick which can be rocked further, for example

[Procedure amendment 16]

[Document to be Amended] Specification [the subject name for an amendment] 0140 -- [Method of Amendment] Change [the contents of an amendment]

[0140]

Since according to this design of a claim 7 the electrode of a couple was prepared on the wiring substrate and pressure-sensitive part material has been arranged on it, composition is simplified and miniaturized, moreover productivity is excellent, and it realizes cheaply.

[Procedure amendment 17]

[Document to be Amended] Specification [the subject name for an amendment] 0141 -- [Method of Amendment] Change [the contents of an amendment]

[0141]

according to this design of a claim 8 -- pressure-sensitive part material -- single -- since it is one sheet and the partial pressure voltage from inter-electrode [of two or more each class] was obtained -- the [the 1st or] -- dispersion in the property for every product of 2 alter operation meanses can be abolished, and the influence of a solid-state difference can be small suppressed now Moreover, partial pressure voltage can be enlarged comparatively and an SN ratio having no amplifier and good can be obtained.

[Procedure amendment 18]

[Document to be Amended] Specification [the subject name for an amendment] 0142 -- [Method of Amendment] Change [the contents of an amendment]

[0142]

According to this design of a claim 9, with a 1st alter operation means by which all the directions of a press actuated valve position can be shown, two or more three or more each class is accomplished, an electrode can be arranged, dispersion in the property for every product can be abolished, the partial pressure voltage corresponding to the inter-electrode electric resistance of each class can be obtained, and all the directions can be detected.

[Procedure amendment 19]

[Document to be Amended] Specification [the subject name for an amendment] 0143 -- [Method of

Amendment] Change [the contents of an amendment]

[0143]

According to this design of claims 10 and 14, to pressure-sensitive part material Also in the state where press operation is not carried out, apply the fixed pressure beforehand, and it prevents changing sharply the level of the 1st or 2nd detecting signal according to the press force operated by this. The 1st or 2nd detecting signal which has the stable level which corresponded to the press force correctly can be obtained now, and operability when performing the game will improve.

[Procedure amendment 20]

[Document to be Amended] Specification [the subject name for an amendment] 0144 -- [Method of Amendment] Change [the contents of an amendment]

[0144]

According to this design of a claim 11, the closed loop on the imagination by which each class of an electrode is arranged For example, since it has the configuration of point symmetries, such as a perfect circle, 2 sets of electrodes in the position of a point symmetry form a series circuit and it is operated by the rigid operating member which pressure-sensitive part material can rock freely When press operation of one group is carried out among 2 sets of electrodes in the position of a point symmetry as well as all the directions of the position by which press operation is carried out being detectable, In order to be able to use resistance of the pressure-sensitive part material covering the electrode on which the press force does not act on the group of another side, and the compressive force does not act in order to obtain partial pressure voltage, therefore to obtain partial pressure voltage, it is not necessary to prepare fixed resistance and simplification of composition can be attained separately.

[Procedure amendment 21]

[Document to be Amended] Specification [the subject name for an amendment] 0145 -- [Method of Amendment] Change [the contents of an amendment]

[0145]

Since it considers as a rockable around the support salient formed in rigid operating member according to this design of a claim 12, in the group of aforementioned another side by which press operation is not carried out among 2 sets of electrodes in the position of a point symmetry, the press force can be prevented from acting certainly and can detect the direction of a press actuated valve position correctly with partial pressure partial pressure voltage, therefore partial pressure voltage. And since the formed press side is formed in operating member, in a press position, the 1st detecting signal which stress with pressure-sensitive part material uniform from the point of symmetry to the radiation direction will act, therefore has the stable level corresponding to the press force can be obtained.

[Procedure amendment 22]

[Document to be Amended] Specification [the subject name for an amendment] 0146 -- [Method of Amendment] Change [the contents of an amendment]

[0146]

According to this design of a claim 13, since it is divided by the hoop direction of a closed loop 31 and is moreover arranged in right above [of each class 27-30], shock absorbing material 40 can obtain the 1st detecting signal which expresses correctly the position of the middle by which press operation was carried out in the middle position of each class 27-30 by carrying out press operation of the operating member 35 between a group 29 and a group 28. It becomes possible correctly to obtain the 1st detecting signal which expresses correctly the operation condition of the operator who enjoys a game, and to change the character in a screen, and the display mode of a background by this.

[Procedure amendment 23]

[Document to be Amended] Specification [the subject name for an amendment] 0147 -- [Method of Amendment] Change [the contents of an amendment]

[0147]

since according to this design of a claim 15 the level of the 1st or 2nd detecting signal is changed into

digital value so that it may become the primary value of a function of operation physical quantity, such as press force or a control input, -- the [the 1st or] -- irrespective of various kinds of properties of 2 alter operation meanses, data processing in a processing means can be correctly performed now smoothly, and data processing becomes easy

[Procedure amendment 24]

[Document to be Amended] Specification [the subject name for an amendment] 0148 -- [Method of Amendment] Change [the contents of an amendment]

[0148]

Since data processing with comparatively much number of steps is performed with a processing means while being able to improve the interest of a game, since according to this design of a claim 16 level discrimination is carried out in quest of the speed of change of the digital value of the 1st or 2nd detecting signal and two or more ranges were judged, the burden of information processing of the microcomputer in the main part of a game machine does not increase.

[Procedure amendment 25]

[Document to be Amended] Specification [the subject name for an amendment] 0149 -- [Method of Amendment] Change [the contents of an amendment]

[0149]

According to this design of claims 17 and 18, positive [of the 1st or 2nd detecting signal] or the speed of a negative change can be calculated and found, and the burden of the microcomputer in the main part of a game machine etc. can be mitigated.

[Procedure amendment 26]

[Document to be Amended] Specification [the subject name for an amendment] 0150 -- [Method of Amendment] Change [the contents of an amendment]

[0150]

By carrying out level discrimination of the value to which digital conversion of the 1st or 2nd detecting signal was carried out on one discrimination level according to this design of a claim 19 By carrying out level discrimination on discrimination level which can obtain as a binary signal or is different in mutual [two or more] again, the number of the push buttons individually formed according to the strength of the former, for example, punch, can be reduced, moreover the signal of a multi-stage story can be acquired, and the miniaturization of composition is attained easily.

[Procedure amendment 27]

[Document to be Amended] Specification [the subject name for an amendment] 0151 -- [Method of Amendment] Change [the contents of an amendment]

[0151]

The data signal corresponding to the combination correlation with the 3rd detecting signal which is the level of the 1st and 2nd detecting signals of an analog formula, and binary [of a digital formula] according to this design of a claim 20

It can ***** and the character of a screen or the display mode of a background can be changed now to varieties.

[Procedure amendment 28]

[Document to be Amended] Specification [the subject name for an amendment] 0152 -- [Method of Amendment] Change [the contents of an amendment]

[0152]

the mode of change of a character [in / a screen / according to this design of a claim 21, corresponding to the level of the 1st or 2nd detecting signal, a data signal is generated serially, and / by this], or a background -- varieties -- it can realize and the interest of a game can be improved

[Procedure amendment 29]

[Document to be Amended] Specification [the subject name for an amendment] 0153 -- [Method of Amendment] Change [the content of an amendment]

[0153]

According to this design of a claim 22, a serial data signal is drawn synchronizing with each frame of a screen, and can attain change of the display mode by which the character in a screen or the background was stabilized.

[Procedure amendment 30]

[Document to be Amended] Specification [the subject name for an amendment] 0154 -- [Method of Amendment] Change [the content of an amendment]

[0154]

According to this design of a claim 23, in order to derive the 1st or 2nd detecting signal corresponding to the press force of the inter-electrode pressure-sensitive part material of a couple, fixed resistance is prepared on the wiring substrate in which those electrodes were formed, by this, assembly operation can be made easy and the miniaturization of composition can be attained. Especially this is an important thing in the alter operation equipment with which an operator holds and operates it by the palm, therefore a miniaturization is demanded.

[Procedure amendment 31]

[Document to be Amended] Specification [the subject name for an amendment] 0155 -- [Method of Amendment] Change [the content of an amendment]

[0155]

The operation in the claims 1-15 of this design not only carries out press operation for example, of the pressure-sensitive part material directly by hands, such as an operator's finger, but Carry out press operation through the operating member 35 in the gestalt of the above-mentioned operation, and it continues for 360 more degrees. Or press operation of the pressure-sensitive part material is carried out with joy sticks, such as a stick rocked to the circumference of 1 axis, or a lever. Instead of furthermore using pressure-sensitive part material, the composition which changes into an electrical signal the variation rate by operation of detecting-element-ed material in which the spring force is given, and obtains the above 1st and the 2nd detecting signal with a spring is included.

TECHNICAL FIELD

[The technical field to which a design belongs]

This design is related with the alter operation equipment used for a home video game machine.

[0002]

PRIOR ART

[Description of the Prior Art]

Typically, the main part of a game machine is connected to the television set used for a display, alter operation equipment is connected and the home video game machine from the former is constituted from a flexible line by this main part of a game machine. The microcomputer for displaying a target of operation or a character, and a background on screens, such as a cathode-ray tube of a television set, is built in the main part of a game machine. It has an alter operation means for alter operation equipment to be equipped with two or more push-buttons which derive a digital formula detecting signal, and to derive an analog formula detecting signal, and these detecting signals are directly given to the main part of a game machine through an analog / serial converter.

[0003]

In this advanced technology, with the microcomputer with which the main part of a game machine is equipped, since data processing of the change of acceleration of a character and the display mode of a background, for example, the amount of a character, movement magnitude, a series of performance information, etc. is carried out, the burden of this microcomputer is large, therefore obtaining the result of an operation takes time. With the alter operation equipment from the former equipped with two or more push-buttons, the binary detecting signal of the digital formula from each of this push-button is given to the main part of a game machine. In a fighting game, it corresponds to the stage of the strength of the punch which a character lets out individually, as shown in drawing 37, push-buttons 1, 2, and 3 are assigned individually, and the detecting signal for every stage of the weakness of punch, inside, and strength is drawn by this. In such advanced technology, the strength of punch cannot be further divided into many stages, and cannot be inputted, but the interest of a game will be reduced. Moreover, since the movement of a character becomes nonsequential, there is sense of incongruity to an operator's intention. Moreover, when the composition in which much more push-buttons 1, 2, and 3 are formed according to the strength of such punch, then the whole composition tend to turn on a large scale and it is going to use many push-buttons about operability, which push-button is the attack of powerful punch, it must always judge which button is the attack of weak punch, a push-button must be chosen, and there is also a problem that operation becomes complicated.

[0004]

Other advanced technology which solves this problem is indicated by JP,7-88252,A. In this advanced technology, it has the analog formula input device which consists of an OPUTO encoder, a trackball, and a joy stick, and the detecting signal outputted from these analog formula input devices is given to the main part of a game machine through a parallel/serial-conversion machine. In this advanced technology, since an OPUTO encoder, a trackball, and a joy stick are used as mentioned above, the structure is complicated, there are many part mark, and the number of erectors is applied, and it turns on a large scale, and there are problems -- a still higher assembly precision may be needed. An operator has alter operation equipment in a hand, and it is the hand, for example, is a finger etc., and since it is operated, especially a miniaturization is required.

[0005]

In other advanced technology, in order to obtain an analog formula detecting signal, an optical rotary encoder is used. In an optical rotary encoder, many slits are formed in a hoop direction and a phot interrupter is prepared in a shading nature disk in relation to this slit.

A light emitting device is arranged at the direction one side of an axis of the aforementioned disk, a photo detector is arranged and this phot in adapter is constituted at the other side. Counting of the number of the pulses acquired from the photo detector corresponding to the light from the light emitting device through a slit is carried out by the counter.

[0006]

In this advanced technology, in order to improve the precision of angle of rotation of the hoop direction of a disk, the number of slits must be increased, therefore a slit must be formed minutely. Or you have to enlarge the speed increasing ratio of the gear train which an operator delivers the rotational-motion force of the operating member which carries out rotation operation to the aforementioned disk again. Therefore, in this advanced technology, composition becomes complicated, there are many part mark, and they turn on a large scale, the number of erectors is applied further, and there is a problem of becoming expensive.

[0007]

Other advanced technology is indicated by JP,6-149474,A, a hall device is arranged in the 4 of the direction of radiation directions focusing on the home position of a rectangular coordinates flat surface in a fixed position, the magnet magnetized by the perpendicular direction of the aforementioned flat surface is moved on the nonmagnetic base plate arranged above a hall device, and the composition which directs a magnet position by the output of a hall device is indicated. In this advanced technology, since it is necessary to move a magnet on a base plate, the space for it is required, therefore composition large-sized-izes. Moreover, since the output signal of a hall device is minute, the amplifier which amplifies the output must be built in alter operation equipment, and composition becomes complicated by this. Furthermore, a high precision is needed for the arrangement position of a hall device, and productivity is bad.

[0008]

The advanced technology of further others is the optical joy stick indicated by JP,6-119105,A, and a light emitting device is prepared in the edge of the rod in which an operator does rocking operation. the light from this light emitting device Through the condenser lens prepared in the fixed position, image formation is carried out to a photo detector, this photo detector is arranged and formed in each vertex position of the square on imagination of four photo-detector elements, and the output from each photo-detector element corresponding to the position of the spot of light is obtained.

[0009]

In this advanced technology, since the output signal from a photo-detector element is minute, amplifier is needed and composition becomes complicated by this. Moreover, a high precision is required for the arrangement position of a photo-detector element, and productivity is inferior.

[0010]

The advanced technology of further others is indicated by JP,8-103567,A. In this advanced technology, with right-and-left both hands, the grasping section of the couple grasped, respectively is connected possible [rotation] relatively, and the electrical signal corresponding to this rotation angle is derived using a variable resistor. A variable resistor tends to produce a poor contact etc. and has composition with it, there are many part mark, composition turns on a large scale, and the number of erectors is further applied by it, and it is expensive. [a short and life and] [complicated]

[0011]

Then, temporarily, composition is simplified, and though it is miniaturized, productivity is excellent and the composition for cheap alter operation can be devised, since dispersion in the property for every product is large, such composition is difficult to actually use it. Nevertheless, to lessen dispersion in the property for every product is desired.

[0012]

EFFECT OF THE INVENTION

[Effect of the Device]

Data processing of a series of performance information of the change of acceleration of the display mode of the character or background which was carrying out data processing with the microcomputer with which the main part of a game machine is equipped in the former according to this design of a claim 2 and claims 3 and 4, for example, the amount, movement magnitude, and a character etc. is carried out with the processing means with which alter operation equipment is equipped about this design, and it is a data signal.

Since it was made to *****, the burden of information processing of the microcomputer with which the main part of a game machine is equipped can decrease, the part and other data processing can be performed now, and the so-called speedup of a game is much more attained by this.

[0136]

According to this design of claims 2 and 4 furthermore, it is a processing means. By giving the indication signal showing data processing of a required kind from the main part of a game machine, further in a claim 4 Since data processing, such as carrying out level discrimination of the 1st and 2nd detecting signals, is performed and the data signal was derived, data-processing operation of the processing means in the alter operation equipment It will be carried out as required, and useless operation is lost, the part and a required operation throughput are made [many], and it becomes further much more possible to mitigate the burden of the microcomputer with which the main part of a game machine is equipped by this.

[0137]

Furthermore, according to this design, a processing means creates and draws a data signal by the data stream which suited the communication format of the main part of a game machine, namely, derives a data signal by the serial bit.

[0138]

the [for obtaining the 1st or 2nd detecting signal according to this design of claims 1 and 5 / the 1st or] -- 2 alter operation meanses attain the miniaturization of composition, and become easy to solve the problem of scramble of an attachment place while they have the level corresponding to the press force operated by hands, such as a finger, and its operability improves by this the [in / a claim 5 / to the detection equipment row of a claim 1 / the 1st and] -- with 2 alter operation meanses, including the composition which carries out press operation of the below-mentioned pressure-sensitive part material directly, for example by hands, such as a finger, includes the composition which carries out press operation of the pressure-sensitive part material etc., and, of course, derives the 1st or 2nd detecting signal over 360 degrees with the joy stick which can be rocked further, for example

[0139]

When the grade of excitement of the operator who enjoys a game becomes intense, this press force becomes large, therefore is the 1st and 2nd detecting signals as it is about an operator's feeling and a feeling.

It can derive as ** level and the interest of a game machine will improve further. Composition for the alter operation which uses such press force for the advanced technology is not realized.

[0140]

Since according to this design of a claim 6 the electrode of a couple was prepared on the wiring substrate and pressure-sensitive part material has been arranged on it, composition is simplified and miniaturized, moreover productivity is excellent, and it realizes cheaply.

[0141]

according to this design of a claim 7 -- pressure-sensitive part material -- single -- since it is one sheet

and the partial pressure voltage from inter-electrode [of two or more each class] was obtained -- the [the 1st or] -- dispersion in the property for every product of 2 alter operation means can be abolished, and the influence of a solid-state difference can be small suppressed now

Moreover, partial pressure voltage can be enlarged comparatively and an SN ratio having no amplifier and good can be obtained.

[0142]

According to this design of a claim 8, with a 1st alter operation means by which all the directions of a press actuated valve position can be shown, two or more three or more each class is accomplished, an electrode can be arranged, dispersion in the property for every product can be abolished, the partial pressure voltage corresponding to the inter-electrode electric resistance of each class can be obtained, and all the directions can be detected.

[0143]

According to this design of claims 9 and 13, it is in pressure-sensitive part material. Also in the state where press operation is not carried out, the fixed pressure is applied beforehand, it can prevent changing sharply the level of the 1st or 2nd detecting signal according to the press force operated by this, the 1st or 2nd detecting signal which has the stable level which corresponded to the press force correctly can be obtained now, and operability when performing the game will improve.

[0144]

According to this design of a claim 10, the closed loop on the imagination by which each class of an electrode is arranged has the configuration of point symmetries, such as a perfect circle. Since 2 sets of electrodes in the position of a point symmetry form a series circuit and it is operated by the rigid operating member which pressure-sensitive part material can rock freely When press operation of one group is carried out among 2 sets of electrodes in the position of a point symmetry as well as all the directions of the position by which press operation is carried out being detectable, In order to be able to use resistance of the pressure-sensitive part material covering the electrode on which the press force does not act on the group of another side, and the compressive force does not act in order to obtain partial pressure voltage, therefore to obtain partial pressure voltage, it is not necessary to prepare fixed resistance and simplification of composition can be attained separately.

[0145]

Since it considers as a rockable around the support salient formed in rigid operating member according to this design of a claim 11, in the group of aforementioned another side by which press operation is not carried out among 2 sets of electrodes in the position of a point symmetry, the press force can be prevented from acting certainly and can detect the direction of a press actuated valve position correctly with partial pressure partial pressure voltage, therefore partial pressure voltage. And since the formed press side is formed in operating member, in a press position, the 1st detecting signal which stress with pressure-sensitive part material uniform from the point of symmetry to the radiation direction will act, therefore has the stable level corresponding to the press force can be obtained.

[0146]

According to this design of a claim 12, since it is divided by the hoop direction of a closed loop 31 and is moreover arranged in right above [of each class 27-30], shock absorbing material 40 can obtain the 1st detecting signal which expresses correctly the position of the middle by which press operation was carried out in the middle position of each class 27-30 by carrying out press operation of the operating member 35 between a group 29 and a group 28. It becomes possible correctly to obtain the 1st detecting signal which expresses correctly the operation condition of the operator who enjoys a game, and to change the character in a screen, and the display mode of a background by this.

[0147]

since according to this design of a claim 14 the level of the 1st or 2nd detecting signal is changed into digital value so that it may become the primary value of a function of operation physical quantity, such as press force or a control input, -- the [the 1st or] -- irrespective of various kinds of properties of 2 alter

operation meanses, data processing in a processing means can be correctly performed now smoothly, and data processing becomes easy

[0148]

Since data processing with comparatively much number of steps is performed with a processing means while being able to improve the interest of a game, since according to this design of a claim 15 level discrimination is carried out in quest of the speed of change of the digital value of the 1st or 2nd detecting signal and two or more ranges were judged, the burden of information processing of the microcomputer in the main part of a game machine does not increase.

[0149]

According to this design of claims 16 and 17, positive [of the 1st or 2nd detecting signal] or the speed of a negative change can be calculated and found, and the burden of the microcomputer in the main part of a game machine etc. can be mitigated.

[0150]

According to this design of a claim 18, level discrimination of the value to which digital conversion of the 1st or 2nd detecting signal was carried out is carried out on one discrimination level, By carrying out level discrimination on discrimination level which can obtain as a binary signal or is different in mutual [two or more] again, the number of the push buttons individually formed according to the strength of the former, for example, punch, can be reduced, moreover the signal of a multi-stage story can be acquired, and the miniaturization of composition is attained easily.

[0151]

The data signal corresponding to the combination correlation with the 3rd detecting signal which is the level of the 1st and 2nd detecting signals of an analog formula, and binary [of a digital formula] according to this design of a claim 19.

It can ***** and the character of a screen or the display mode of a background can be changed now to varieties.

[0152]

the mode of change of a character [in / a screen / according to this design of a claim 20, corresponding to the level of the 1st or 2nd detecting signal, a data signal is generated serially, and / by this], or a background -- varieties -- it can realize and the interest of a game can be improved

[0153]

According to this design of a claim 21, a serial data signal is drawn synchronizing with each frame of a screen, and can attain change of the display mode by which the character in a screen or the background was stabilized.

[0154]

According to this design of a claim 22, in order to derive the 1st or 2nd detecting signal corresponding to the press force of the inter-electrode pressure-sensitive part material of a couple, fixed resistance is prepared on the wiring substrate in which those electrodes were formed, by this, assembly operation can be made easy and the miniaturization of composition can be attained. Especially this is an important thing in the alter operation equipment with which an operator holds and operates it by the palm, therefore a miniaturization is demanded.

[0155]

Mind the operating member 35 in the form of the above-mentioned operation the operation in the claims 1-14 of this design not only carries out press operation of the pressure-sensitive part material directly by hands, such as an operator's finger, but. The composition which changes into an electrical signal the variation rate by operation of detecting-element-ed material in which the spring force is given, and obtains the above 1st and the 2nd detecting signal with a spring is included instead of carrying out press operation of the pressure-sensitive part material, and using pressure-sensitive part material further with joy sticks, such as a stick which carries out press operation, and continues for 360 more degrees, or is rocked to the circumference of 1 axis, or a lever.

[Filing Date] March 31, Heisei 9. [Procedure amendment 2]

[Document to be Amended] Specification. [Item(s) to be Amended] 0014. [Method of Amendment] Change.

[Proposed Amendment]

[0014]

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Device]

The purpose of this design is offering the alter operation equipment for home video game machines which improves the responsibility of change of a character and the display mode of a background as can perform the result of an operation by alter operation in a short time, and enabled it to improve the interest of a game by building in a processing means and making a part of operation which was being performed with the microcomputer with which the main part of a game machine is equipped from the former perform with this processing means.

[0013]

Composition is simplified, and it is miniaturized, and other purposes of this design are excellent in productivity, and are offering the improved alter operation equipment for home video game machines made it it is not only cheap, but dispersion of in the property for every product lost further.

[0014]

MEANS

[Means for Solving the Problem]

This design is alter operation equipment for home video game machines which changes a character or the display mode of a background. This alter operation equipment It has the 1st, the 2nd, and 3rd alter operation meanses. The 1st alter operation means The 1st detecting signal which has the 1st pressurization means for showing all the directions of the position of operation, consisted of two or more 1st detection equipments of an analog formula from which an electrical property changes with the press force by the 1st pressurization means, and was detected from the 1st detection equipment

It *****. The 2nd alter operation means has a 2nd pressurization means to show the direction of the shape of a straight line. It consists of the 2nd detection equipment of an analog formula from which an electrical property changes with the press force by the 2nd pressurization means. The 2nd detecting signal detected from the 2nd detection equipment is drawn. The 3rd alter operation means Consisting of the 3rd detection equipment which detects the state where it is not operated, and an operation state, the 3rd detection equipment draws binary level. The alter operation equipment for these home use video game machines Further A detecting-signal processing means to generate the data signal showing a series of performance information for acquiring the 1st, the 2nd, and 3rd detecting signals through an interface, and operating a character or a background, It is alter operation equipment for home video game machines characterized by having the means of communications which derives a data signal on the main part of game machine.

[0015]

The detecting-signal processing means in a claim 1 is the detecting signal of the digital value which carried out analog-to-digital conversion of the detecting signal of the 1st and 2nd analog formulas, or the 3rd digital formula.

You may also include only the composition derived to ** and a bit serial, and may also include the composition which performs other data-processing operation further.

[0016]

the [in a claim 1 / the 1st and] -- 2 pressurization meanses The 1st pressurization means for consisting of the operating member 35 which carries out press operation directly by hands, such as a finger, with the gestalt of the below-mentioned operation, and showing all the directions of the position of operation You may be the operating member 35 by which press operation is carried out over 360 degrees which is explained in relation to below-mentioned drawing 3 - drawing 9 . You may be the composition which carries out press operation of the pressure-sensitive part material etc. over 360 degrees with joy sticks, such as a stick which can be rocked, or a lever, again. further again or the 2nd pressurization means You may be the operating member 35 which carries out press operation directly by hands, such as a finger, so that it may state in relation to below-mentioned drawing 31 - drawing 36 . Or you may be the composition which carries out press operation of the pressure-sensitive part material etc. with joy sticks, such as a stick which can be rocked to the circumference of 1 axis, or a lever. You may be the composition which furthermore moves operating member in the shape of a straight line by hands, such as a finger, and carries out press operation of the pressure-sensitive part material etc., and this 2nd pressurization means includes the composition for pressurizing or decompressing pressure-sensitive part material etc. in the direction of the shape of a straight line. further -- the [this / the 1st and] -- the front face where press operation of the pressure-sensitive part material itself in case 2 pressurization meanses carry out press operation of the pressure-sensitive part material etc. directly by hands, such as a finger, is carried out -- containing -- the [these 1st / the / and] -- 2 pressurization meanses include all the composition that carries out press operation of the press means etc. further -- the [the 1st and] -- 2 pressurization meanses may be the composition that resist for example, not only the composition that carries out press

operation but the spring force, press pressure-sensitive part material, an indicated block displaces, and optical composition, magnetic composition, or other composition detect movement of the indicated block
[0017]

the [the 1st and] -- with the gestalt of the below-mentioned operation, 2 detection equipment may be the composition of detecting the variation rate of the aforementioned detecting-element-ed material with other gestalten of operation of this design, including electrodes 27-30,122,126, the pressure-sensitive part material 32, fixed resistance 123, etc., and may be other composition

[0018]

the 3rd detection equipment -- a digital formula push-button -- you may be -- the [or] -- it is constituted like 2 alter-operation meanses 18 and 19, you may have the composition which makes binary the obtained digital value which carried out analog-to-digital conversion on one discrimination level, other composition may realize, and all the composition that derives binary level is included

[0019]

Moreover, this design is set to the alter operation equipment for home video game machines which generates the character in a game etc. by the three-dimension-operation technique. A 1st operation means to generate the 1st detecting signal of the analog formula which can show all the directions of the position of operation, A 2nd operation means to generate the 2nd detecting signal of analog formula A 3rd operation means to generate the 3rd detecting signal of a digital formula, The data-processing means for which is a processing means to have two or more data-processing meanses, and the main part of a game machine asks is judged. Or a multiple-times judgment is made. or [belonging the value which carried out analog-to-digital conversion of the 1st and 2nd detecting signals to which range to two or more thresholds beforehand set up by the data-processing means] -- 1 time -- It is alter operation equipment for home video game machines characterized by including a processing means to generate the data stream of the data signal which suited the format of the main part of a game machine to make processing by the aforementioned data-processing means corresponding to the range perform, and to derive to the main part of a game machine.

[0020]

Moreover, this design divides the front face of a character or a background into many fields, attaches shading to each field alternatively, and displays it on a screen in three dimensions. Or a character or the display mode of a background is set to the changing alter operation equipment for home video game machines, using the three-dimension-operation technique which changes a view position and is displayed in three dimensions. While showing all the directions of the position of operation A 1st alter operation means to generate the 1st detecting signal of an analog formula A 2nd alter operation means to generate the 2nd detecting signal of an analog formula, A 3rd alter operation means to have level on the other hand, and to generate the 3rd detecting signal of the digital formula which has another side level by not being operated by being operated, The indication signal showing data processing of the required kind from the main part of game machine is answered. The signal which carried out analog-to-digital conversion of the 1st and 2nd detecting signals, and carried out data processing of the signal by which analog-to-digital conversion was carried out or its signal by which analog-to-digital conversion was carried out corresponding to the indication signal Carry out level discrimination, judge the aforementioned range which belongs among two or more ranges of each defined beforehand, and the data signal by which data processing was carried out corresponding to the judged aforementioned range is created by the data stream which suited the communication format with the main part of a game machine. It is alter operation equipment for home video game machines characterized by including a processing means to derive on the main part of a game machine.

[0021]

2 alter operation meanses are established. the [the 1st to which the important composition of this design generates the 1st and 2nd detecting signals of an analog formula to alter operation equipment, and] -- for example, [enable it / to change the character of a screen, or the display mode of a background

continuously by the three dimension-operation technique, for example / not only] Further It is preparing the processing means realized with a microcomputer etc. in alter operation equipment, and making data processing share with it by this processing means.

[0022]

Therefore, since the processing means with which alter operation equipment is equipped as mentioned above can be made to perform a part of data processing [at least] of the microcomputer prepared in the main part of a game machine from the former, the burden by the side of the main part of a game machine can be made to mitigate. the [therefore, / the 1st, the 2nd, and] -- with the microcomputer of the main part of a game machine by operation of 3 alter operation meanses, time required to obtain the result of an operation can be shortened, the microcomputer of the part and the main part of a game machine can perform other data processing, and it becomes possible to make change of the character in a game and the display mode of a background speed up further of it, and it can improve the interest of a game

[0023]

Moreover, this design answers the indication signal showing data processing of the required kind to which a processing means is given from the main part of a game machine, and it is characterized by performing data processing which the indication signal expresses.

[0024]

Furthermore, it cannot say that the processing means is always performing much data processing, but only data processing which an indication signal directs can be performed like claims 2 and 4, and useless data processing cannot be performed, but time to obtain the result of an operation by this can be shortened.

[0025]

The data-processing means with which the processing means in a claim 3 is equipped includes the composition which performs each data processing, such as the utility model registration claim claims 14-21 shown above, or the composition which performs other data processing. Making a multiple-times judgment of to which range the value which carried out analog-to-digital conversion is belonged includes opening a time interval, carrying out analog-to-digital conversion twice or more, and performing data processing, in order to find the operated speed like the utility model registration claim claims 15-17 shown above.

[0026]

The processing means of a claim 3 judges the data-processing means for which the main part of a game machine asks, this data-processing means to want may be a data-processing means specified by the indication signal from the microcomputer of the main part of a game machine, or it includes the composition which the data-processing means is switched [composition] and operates it by the circuit changing switch operated by the operator with whom this alter operation equipment is equipped.

[0027]

When a character is a human body, change of the character in claims 1 and 4 or the display mode of a background includes at least the thing of a character or a background which a part, for example, the truncus, or membrum inferius of the human body etc. carries out movement etc., and is changed in part, while including that movement of the character itself or the background itself etc. changes by carrying out.

[0028]

The indication signal in claims 2 and 4 may be a signal showing the command which is an instruction, or you may be a signal showing the program which performs data processing given to the detecting-signal processing means of a claim 1, or the processing means of claims 3 and 4 from the main part of a game machine, and the aforementioned detecting-signal processing means or the aforementioned processing means performs data processing according to this program.

[0029]

This processing means corresponds to the content of data processing for which the indication signal

transmitted from the microcomputer with which the main part of a game machine is equipped asks. The signal by the interface which carried out analog-to-digital conversion the 1st and 2nd detecting signals. Or for example, the signal which carried out data processing like claims 14-17 corresponding to the indication signal. The data signal by which made a multiple-times judgment and data processing was carried out [to which range it belongs to 1 or two or more discrimination level which were set up beforehand, and] corresponding to 1 time or the range by which a judgment was made [aforementioned] is generated by the data stream which suited the communication format of the main part of a game machine, and it derives on the main part of a game machine.

[0030]

If this design is followed, level discrimination is carried out, the signal which the processing means carried out level discrimination of the signal with which analog-to-digital conversion of the 1st and 2nd detecting signals was carried out as it was, and judged the range, or carried out data processing of the signal by which analog-to-digital conversion was carried out corresponding to the indication signal from the main part of a game machine is judged, and this data processing includes other data processing in the utility model registration claim claim 14 shown above and claims 15, 16, and 17, and a row. Furthermore corresponding to the judged aforementioned range, data processing of the data signal is carried out. It is created and drawn by the data stream which suited the communication format from the main part of a game machine, and this data signal by which data processing was carried out. You may be a signal showing the range by which a judgment was made [aforementioned], may be the signal created so that it might become a data stream, or may be the data signal in which others carried out data processing to the range claim 18 and claim 19 row of a utility model registration claim shown above.

[0031]

If this design is followed, the microcomputer with which the main part of a game machine is equipped will answer a data signal from alter operation equipment, and will express a character or a background on the screen of display meanses, such as cathode-ray tubes, such as a television set, as the three-dimension-operation technique. This three-dimension-operation technique divides into many small fields the front face of the sphere which is a character. It is the operation technique which attaches shading to each field alternatively and is displayed on it in three dimensions. moreover, this three-dimension-operation technique. For example, it is the operation technique it is displayed that it can display in three dimensions from the view which changed the view position which looks at the building used as a background, and entered inside from from outside the building, for example, can see the transverse plane of the building, the side, a tooth back, an inside, etc. The interest of a game can be improved now by such three-dimension-operation technique.

[0032]

Moreover, this design is characterized by the 1st or 2nd detecting signal having the level corresponding to the press force operated.

[0033]

the [in claims 1, 3, and 4 / the 1st and] -- 2 alter-operation meanses may be the composition using the composition which used magnetic sensing elements, such as an OPUTO encoder or an optical rotary encoder, a trackball, a joy stick, and a hall device, the optical joy stick, the variable resistor, etc., or may be the composition that electrostatic capacity changes with operations, and may be composition which derives the electrical signal which has the level which changes with the press force of the hand described further below

[0034]

if this design of claims 1 and 5 is followed -- the [the 1st or] -- the 1st or 2nd detecting signal which has the level corresponding to the press force operated with the finger of an operator's hand etc. by analog operation by 2 alter operation meanses is derived. That is, the 1st or 2nd detecting signal is an electrical signal which has the level corresponding to the press force by the hand containing an operator's finger etc. this -- the [the 1st or] -- it is easy to be able to attain the miniaturization of the composition of 2

alter operation meanses, and to solve the problem of scramble of the place of the outside surface of housing in alter operation equipment, and operability is still better

[0035]

moreover, this design -- the [the 1st or] -- 2 alter operation meanses Rigid electric insulation wiring substrate Electrode of the couple mutually adjoined and arranged on a wiring substrate It is arranged over the electrode of the aforementioned couple and is characterized by including the pressure-sensitive part material which has the resiliency from which inter-electrode electric resistance changes with the press force by an operator's hand.

[0036]

If this design is followed, the electrical signal which the electric resistance through the inter-electrode pressure-sensitive part material of the couple on a wiring substrate changes, therefore has the level corresponding to the press force can be derived by carrying out press operation of the pressure-sensitive part material by the hand containing a finger etc. According to this composition, that the electrode of a couple is formed on one wiring substrate, and by using pressure-sensitive part material, composition is simplified and miniaturized, and productivity is excellent, therefore it realizes cheaply.

[0037]

In claims 5 and 6 the 1st or 2nd detecting signal In order to obtain the 1st or 2nd detecting signal which has the level corresponding to the press force operated, and has the level corresponding to this press force You may make it use pressure-sensitive part material. such pressure-sensitive part material The press force of an operator's hand may be constituted so that it may act directly from operating member 35 in the gestalt of the below-mentioned operation. You may be the composition which the operating member 35 is omitted and carries out press operation of the front face of the pressure-sensitive part material 32 directly with an operator's finger etc. or with other gestalten of operation of this design, further The composition which presses pressure-sensitive part material is included by joy sticks, such as a stick or a lever, or the member which moves.

[0038]

About this design, in this way, although the press force may act on pressure-sensitive part material directly You may be the composition pressed through the component which exercises by operation of an operator. Without furthermore using pressure-sensitive part material, an operator presses by hand etc. the member which moves according to the spring force of a spring, and it is good also considering the variation rate of the member as optical composition, magnetic composition, and composition further changed into a detecting signal using other composition.

[0039]

Therefore, the press force by the operation in the aforementioned utility model registration claim etc. must be interpreted as the composition which detects the variation rate of the member which resists and moves to coiled spring etc. further, for example, and the thing which includes other composition etc. further including the composition which presses pressure-sensitive part material through the component of not only the composition that presses pressure-sensitive part material directly but others by hands, such as an operator's finger.

[0040]

Moreover, in this design, the electrode of the aforementioned couple accomplishes two or more each class, and it is prepared. Pressure-sensitive part material single -- it is one sheet and arranges over the electrode of all groups -- having -- The electrode of two or more groups Through pressure-sensitive part material, a series circuit is formed and it connects. The press force by operation is given on pressure-sensitive part material in the upper part near the electrode of at least one group. It is characterized by deriving the partial pressure voltage from inter-electrode [of each class] as the 1st or 2nd detecting signal.

[0041]

if this design is followed -- two or more each class -- the electrode of a couple -- having -- single -- since it

is arranged over the electrode of all groups, namely, the electrode of all groups is covered and common pressure-sensitive part material is used, the pressure-sensitive part material of one sheet can prevent dispersion in change of the electric resistance corresponding to the press force by dispersion in the property of pressure-sensitive part material as much as possible

[0042]

And if this design is followed, since the electrode of two or more groups will form a series circuit and will be connected through pressure-sensitive part material, the partial pressure voltage obtained from inter-electrode [of each class] corresponds to the ratio of the electric resistance by the pressure-sensitive part material of the voltage given to the ends of the series circuit. Whether dispersion in the property of the electric resistance corresponding to the press force of pressure-sensitive part material exists by this or the properties of pressure-sensitive part material differ for every alter operation equipment, dispersion in the level of the 1st or 2nd detecting signal of the analog formula given to the processing means by dispersion in such a property can be abolished. Since it is still easier to obtain partial pressure voltage on comparatively big level, amplifier is not needed.

[0043]

Moreover, this design is the 1st alter operation means. Rigid electric insulation wiring substrate It is the electrode which accomplishes two or more three or more each class, and is formed on this wiring substrate. the electrode of each class The electrode by which is adjoined mutually, and a pair is accomplished, it is arranged and the electrode of each class is arranged on the closed loop on imagination, Are one sheet, it is arranged over the electrode of all groups, and the conductive pressure-sensitive part material which has the resiliency from which the inter-electrode electric resistance which accomplishes the pair of each class according to the press force changes is included. -- single -- Through pressure-sensitive part material, the electrode of two or more groups forms a series circuit, and is connected. It is characterized by deriving the partial pressure voltage from inter-electrode [of each class] as the 1st detecting signal of the above.

[0044]

If this design is followed, on the closed loop on imagination, the electrode of three or more each class is arranged, and the 1st alter operation means for showing all the directions of the position of operation is constituted. This closed loop is a perfect circle, each class opens an interval in a hoop direction by a unit of 90 degrees, and may be arranged a total of 4 sets, and each class of this electrode is arranged at least three or more.

By obtaining the partial pressure voltage corresponding to each electrode by this, a press position can be known over all the directions.

[0045]

Moreover, in this design, the closed loop on the aforementioned imagination has the configuration of a point symmetry. Each class which accomplishes the pair of an electrode It is arranged at a point symmetry and even sets of four not lesses are prepared. The operating member which consists of a rigid material is included further. This operating member It has the periphery arranged on the surface of an opposite side with the electrode of the thickness direction of pressure-sensitive part material, and is supported free [rocking]. It is characterized by for 2 sets of electrodes in the position of a point symmetry forming a series circuit, and connecting them through pressure-sensitive part material.

[0046]

If this design is followed, each class which the closed loop on imagination may have the configuration of a point symmetry, for example, may be a perfect circle as mentioned above, and accomplishes the pair of an electrode Even sets of four not lesses are prepared. especially about this design By 2 sets of electrodes in the position of a point symmetry forming a series circuit, connecting them through pressure-sensitive part material, and using the rigid operating member which can be rocked freely When press operation is carried out in one group between two each class in a point symmetric position, in the group of another side, press operation is not carried out, but the electric resistance by the inter-electrode

pressure-sensitive part material of this group by which press operation is not carried out can be used in order to obtain partial pressure voltage. In this way, in order to obtain partial pressure voltage, it is not necessary to prepare fixed resistance etc. and simplification of composition can be attained separately. The below-mentioned shock absorbing material may be omitted.

[0047]

Moreover, pressure-sensitive part material has a central hole, and this design's is annular along with the closed loop on the aforementioned imagination. Operating member It has the support salient which inserts in the hole of the center of the above and is supported on a wiring substrate. The front face by the side of the pressure-sensitive part material of the aforementioned periphery of operating member an axis to **** or ** of operating member -- taking -- the direction of an axis -- the aforementioned support salient to ****, or ** -- the press side which inclined like -- having -- It is characterized by the shock absorbing material which has resiliency intervening between the aforementioned press side and pressure-sensitive part material.

[0048]

If this design is followed, operating member has the support salient which inserts in the hole of the center of annular pressure-sensitive part material. When this support salient is supported on a wiring substrate, and rocking of supporter material of it is enabled, therefore press operation is carried out by one side of two symmetrical positions of a closed loop, in the position of another side, the press force cannot act and partial pressure voltage can be correctly obtained corresponding to a press position.

[0049]

if this design is furthermore followed -- the front face by the side of the pressure-sensitive part material of the periphery of operating member -- an axis to **** or ** of operating member -- taking -- the direction of an axis -- the aforementioned support salient -- **** or ** -- it has the press side formed in the shape of a truncated cone like, and shock absorbing material intervenes between this press side and pressure-sensitive part material Therefore, when press operation of the operating member is carried out, it will be pressed by pressure-sensitive part material by the most uniform possible pressure in the radiation direction from the point of symmetry through shock absorbing material. Therefore, while the big press force cannot act on pressure-sensitive part material partially and being able to prevent breakage of pressure-sensitive part material, the press force uniform in the radiation direction can act on the electrode of the couple of each class currently formed on the wiring substrate by pressure-sensitive part material from the point of symmetry, and the stable electric resistance depending on the press force can be acquired.

[0050]

Moreover, this design is characterized by for shock absorbing material being divided by the hoop direction of a closed loop, and being arranged in right above [of each class].

[0051]

The 1st detecting signal of each class which expresses the aforementioned middle position correctly when following this design and press operation of the middle position of each class in alignment with the hoop direction of the closed loop in the periphery of operating member is carried out

[0052]

Moreover, the operating member to which this design changes from a rigid material to an opposite side with the electrode of the thickness direction of pressure-sensitive part material is prepared. In this operating member A displacement limit means to restrict the variation rate which resists the resiliency of pressure-sensitive part material so that pressure-sensitive part material may be beforehand compressed by operating member is established. By compressing pressure-sensitive part material beforehand It is out of range and is characterized by the thing from which the amount of abrupt changes of the level of a detecting signal arises corresponding to the variation of the press force of operating member and which is done for the press operation of the operating member.

[0053]

Moreover, a displacement limit means by which this design restricts the variation rate which resists the resiliency of pressure-sensitive part material so that pressure-sensitive part material may be beforehand compressed by operating member to operating member is established. By compressing pressure-sensitive part material beforehand, it is out of range and is characterized by the thing whose amount of abrupt changes of the level of a detecting signal arises corresponding to the variation of the press force of operating member and which is done for the press operation of the operating member.

[0054]

If this design is followed, even if it is in the state in which operating member has not carried out press operation by hands, such as an operator's finger, the press force will act so that a fixed pressure may be beforehand applied to pressure-sensitive part material and may compress. The detecting signal by press operation can be obtained now in the range which variation with the loose level of the detecting signal corresponding to the variation of the press force by the hand produces by this. Therefore, it corresponds to the slight variation of the press force by the hand, and is a detecting signal.

** level is not changed sharply and operability becomes good.

[0055]

Moreover, this design changes a processing means into the digital value from which the level of the 1st or 2nd detecting signal serves as the primary value of a function of operation physical quantity, and is characterized by carrying out level discrimination and judging this digital value.

[0056]

If this design is followed, it is changed into the digital value from which the level of the 1st or 2nd detecting signal serves as the primary value of a function, such as press force by hands, such as operation physical quantity, for example, a finger etc., or the amount of operation displacement, the value of nonlinear characteristics is changed into a linear value in this way, and it can use because of level discrimination. the [therefore, / the 1st or] -- data processing of the consecutiveness in a processing means can be performed correctly and easily irrespective of the property of 2 alter operation meanses

[0057]

Moreover, this design is characterized by for a processing means finding the speed of the value change to which analog-to-digital conversion of the 1st or 2nd detecting signal was carried out [aforementioned], and carrying out level discrimination and judging the speed of the change.

[0058]

If this design is followed, to the case of the value by which the analog / DETARU conversion of the 1st or 2nd detecting signal were carried out, for example, the digital formula signal which consists of 7 bits The speed of the value change showing 0-127 is found, for example, it asks for the time rate of change of the digital value corresponding to the press force by press operation, level discrimination of the speed of the change is carried out, one of two or more ranges is judged, and the data signal by which data processing was carried out corresponding to the judged range is derived. By this, change of the character in a game or the display mode of a background can be diversified, and the interest of a game can be improved. Moreover, such data processing has comparatively many execute steps, therefore about this design, although long time will be needed by the time it obtains the result of an operation when the microcomputer with which the main part of a game machine is equipped from the former tends to attain, since it performs such data processing by processing meanses, such as a microcomputer with which alter operation equipment is equipped, does not need long time for obtaining the result of an operation, but can aim at speedup of a game.

[0059]

Moreover, this design is a processing means. The signal with which analog-to-digital conversion of the 1st or 2nd detecting signal was carried out [aforementioned] the 1st -- the 2nd discrimination level V_{t1} which exceeds the 1st discrimination level V_1 after the 1st time W_1 progress beforehand defined after becoming more than discrimination level V_1 -- level discrimination -- carrying out -- or -- A processing

means the signal with which analog-to-digital conversion of the 1st or 2nd detecting signal was carried out [aforementioned] -- the 3rd -- after the 2nd time W2 progress beforehand defined after becoming less than [discrimination level V2] -- the 3rd -- it is characterized by carrying out level discrimination on the 4th discrimination level Vt2 which is less than [discrimination level V2]

[0060]

if this design is followed, it is shown in below-mentioned drawing 24 and below-mentioned drawing 25 -- as -- the [the 1st or] -- it can ask by level discrimination, speed, i.e., time rate of change, positive [of the operation in 2 alter operation meanses], or negative

[0061]

Moreover, this design is characterized by a processing means carrying out level discrimination of the signal with which analog-to-digital conversion of the 1st or 2nd detecting signal was carried out [aforementioned] on discrimination level which is different in 1 or mutual [two or more].

[0062]

If this design is followed, level discrimination of the digital value of the 1st or 2nd detecting signal can be carried out on one discrimination level, the binary signal of a digital formula can be obtained in this way, or level discrimination can be carried out on two or more mutually different discrimination level, this digital value can be divided into three or more ranges again, and it can judge. Although the strength of the punch in a fighting game can be divided into three stages by above-mentioned drawing 37 and can be inputted from the former by carrying out level discrimination of the 1st or 2nd detecting signal of an analog formula on two or more discrimination level as mentioned above especially this design -- further -- many stages -- dividing -- the [single moreover / the 1st or] -- while being able to input by 2 operation meanses and being able to attain the miniaturization of composition, change of the display mode of the character or the background of having met further by an operator's feeling is realizable

[0063]

Moreover, this design is characterized by a processing means creating a data signal corresponding to correlation of the 3rd detecting signal in the range row by which a judgment of the 1st and 2nd detecting signals was made [aforementioned].

[0064]

the 1- which will be obtained by operation of the 1st - the 3rd alter operation means if this design is followed -- a data signal is created corresponding to the correlation which is the combination pattern of each 3rd detecting signal Therefore, change of many of characters in a game or display modes of a background can be obtained.

[0065]

Moreover, a processing means carries out level discrimination of the signal with which analog-to-digital conversion of the 1st or 2nd detecting signal was carried out [aforementioned] on discrimination level which is different in mutual [two or more], and this design judges the aforementioned range, and is characterized by deriving the serial data signal from which a logical value changes with time progress corresponding to the range by which a judgment was made [aforementioned].

[0066]

if this design is followed -- the [the 1st or] -- by operation of 2 alter operation meanses, the data signal which changes serially can be drawn and the main part of a game machine can be given The character of the screen in a game or the display mode of a background can be changed still more mostly by this. And such data processing needs comparatively many numbers of steps, in the advanced technology, although it is necessary to make the microcomputer with which the main part of a game machine is equipped realize, since it performs such data processing by the processing means with which alter operation equipment is equipped, can mitigate the burden of the microcomputer of the main part of a game machine, and can improve speedup of a game about this design.

[0067]

Moreover, with 1 or two or more frames corresponding to the range by which the processing means made

the unit two or more frame numbers defined beforehand synchronizing with each frame of a screen, and a judgment of [of two or more of those frames] was made [aforementioned], this design is one logical value and is characterized by deriving serially the data signal which is the logical value of another side by the residual frame.

[0068]

If this design is followed, synchronizing with each frame of the screen in display meanses, such as a television SHON receiver, a character or the display mode of a background can be changed so that it may mention later in relation to drawing 15 . the [for example, / the 1st or] -- when it has the composition by which press operation of the 2 alter operation meanses is carried out, the traverse speed of a character or a background can be changed according to the 1st or 2nd detecting signal obtained corresponding to the press force

[0069]

Moreover, this design is characterized by including further the fixed resistance which is prepared on the aforementioned wiring substrate, is connected to one electrode of the electrodes of a couple in series, forms a series circuit with the inter-electrode pressure-sensitive part material of the aforementioned couple, and obtains partial pressure voltage as the 1st or 2nd detecting signal.

[0070]

If this design is followed, in order to obtain partial pressure voltage further, the fixed resistance which forms a series circuit will be prepared on the wiring substrate in which the electrode of a couple was formed, so that it may mention later in relation to drawing 31 - drawing 33 . Therefore, while assembly operation becomes easy, it is also possible to simplify composition and to miniaturize.

[0071]

[The gestalt of implementation of a design]

Drawing 1 is the plan simplifying and showing the composition of the one whole gestalt of operation of this design, and drawing 2 is the block diagram simplifying and showing the composition of the home whole video game machine. The main part 6 of a game machine is fundamentally connected to the television set 5 used for a display through a line 7, by the flexible line 8, the alter operation equipment 9 which is a controller is connected, and a home video game machine is constituted from an input/output interface 65 by this main part 6 of a game machine. A character 12 and a background 13 are displayed on Screen 11 of the display meanses 10, such as a cathode-ray tube of a television set 5, or liquid crystal.

Data processing of the main part 6 of a game machine is answered and carried out to a data signal from the disk 14 which is the record medium with which the program of a game was recorded, and the alter operation equipment 9 which reads the program and minds the flexible line 8, and it contains the microcomputer 15 which creates the video signal for the display of a television set 5.

[0072]

This microcomputer 15 performs data processing which divides the front face of a character 12 or a background 13 into many fields, and performs data processing which attaches shading to each field alternatively and is displayed on it in three dimensions on Screen 11 of the display means 10, or changes a view position into it, and is displayed on it in three dimensions by the three-dimension-operation technique. Furthermore, this microcomputer 15 performs data processing for answering a data signal from alter operation equipment 9, and changing a character 12 or the display mode of a background 13. The synchronizing signal which synchronized with level/vertical synchronizing signal of the video signal given to a television set 5 from the main part 6 of a game machine is given to the processing means 16 realized with the microcomputer with which alter operation equipment 9 is equipped again, and the processing means 16 creates and derives a data signal by this by the data stream which suited the communication format with the main part 6 of a game machine.

[0073]

The 1st alter operation means 17 which is an analog control button, the 2nd alter operation meanses 18 and 19 which are analog multiple-purpose buttons, and two or more 3rd alter operation meanses 20 and

21 which are digital formula push-buttons are formed in the housing 22 grasped by an operator's hand, and alter operation equipment 9 is constituted. It can be arranged at the left part of housing 22, press operation can be carried out with an operator's, for example, a left hand, finger etc., and the 1st alter operation means 17 can generate the 1st detecting signal of the analog formula which shows all the directions of the actuated valve position, and can direct the character 12 in a game, and the directivity of movement of a background 13 by this. The 2nd alter operation meanses 18 and 19 are arranged at right and left of the anterior part of housing 22, are used for the various uses in a game, and generate the 2nd detecting signal of an analog formula. the [these 1st / the / and] -- 2 alter operation meanses 17; -- the 1st and 2nd detecting signals from 18 and 19

The central-process circuit 24 of the processing means 16 is given through ** and an analog-to-digital converter 23. They are arranged at the center and right part of housing 22, on the other hand, the 3rd alter operation meanses 20 and 21 have level, for example, high level, by carrying out press operation, and by not carrying out press operation, generate the 3rd detecting signal of the digital formula which has another side level, for example, a low level, and give it to the central-process circuit 24 of the processing means 16.

[0074]

the central-process circuit 24 with which the processing means 16 is equipped answers an indication signal from the microcomputer 15 of the main part 6 of a game machine, and the analog-to-digital converter 23 which works as an interface is operated -- making -- the [the 1st and] -- 2 alter operation meanses 17; -- analog-to-digital conversion of the 1st and 2nd detecting signals from 18 and 19 is carried out This indication signal

It is a signal showing the required processing which should be carried out data processing in ** and the central-process circuit 24. The signal by which analog-to-digital conversion was carried out, or the signal which carried out data processing so that the digital-conversion value which turns into the primary value of a function of the press force like the after-mentioned in the signal by which analog-to-digital conversion was carried out corresponding to an indication signal might be calculated the central-process circuit 24 It judges by carrying out level discrimination of the aforementioned range which belongs among two or more ranges of each defined beforehand. The data signal obtained by carrying out data processing corresponding to the judged aforementioned range is created and derived by the data stream which suited the communication format with the microcomputer 15 of the main part 6 of a game machine.

[0075]

An indication signal may be a signal showing the computer program for performing data processing in a command, an instruction, and the central-process circuit 24, and may be a signal including the information on other.

[0076]

Drawing 3 is drawing of longitudinal section of the 1st alter operation means 17, drawing 4 is the plan which the 1st alter operation means 17 simplified, and drawing 5 is the cross section seen from cutting plane line V-V of drawing 3 . With reference to these drawings, the rigid electric insulation wiring substrate 26 consists of synthetic resin, such as for example, a paper phenol, and each class 27-30 of three or more plurality, the gestalt of this operation four or more even number, for example, 4, is formed on this wiring substrate 26. The electrodes 27a and 27b of a couple adjoin mutually, and one group 27 opens an interval and is arranged. Moreover, similarly, the electrodes 28a and 28b of a couple adjoin mutually, and one group 28 opens an interval, is arranged and has composition with other same groups 29 and 30.

[0077]

On the closed loop 31 which has the configuration of the point symmetry on imagination, around the point of symmetry 42, at equal intervals, these groups 27-30 open an interval in a hoop direction by a unit of 90 degrees with the gestalt of this operation, and are arranged, for example. A closed loop 31 is a

perfect circle with the gestalt of this operation. Each aforementioned electrode of each class 27-30 may consist of copper, aluminum, carbon, and other conductive material. Each class 27 and 28 which accomplishes the pair of an electrode is arranged at a point symmetry, and each class 29 and 30 is arranged at a point symmetry.

[0078]

the pressure-sensitive part material 32 -- single -- it is one sheet, and it is arranged over the electrode of all the groups 27-30, has the resiliency from which the electric resistance between electrode 27a which accomplishes the pair of one group 27, and 27b changes according to the press force of the thickness direction (drawing 3 and the vertical direction of drawing 5) by operation of hands, such as an operator's finger, and is conductivity The electric resistance of the pressure-sensitive part material 32 pressed between electrode 28a which accomplishes the pair of other one group 28, and 28b changes, and, as for this, the same is said of the residual groups 29 and 30. The pressure-sensitive part material 32 consists of constituents of graphite, such as pressure-sensitive conductive rubber, and conductive rubber. The pressure-sensitive part material 32 is an annular board which has the central hole 33 and meets the aforementioned closed loop 31.

[0079]

the periphery 36 of rigidity [operating member / 35] which consists of synthetic-resin material and is arranged on the surface of an opposite side (upper part of drawing 3) in the groups 27-30 of the electrode of the thickness direction of the pressure-sensitive part material 32 -- having -- further -- the center of the pressure-sensitive part material 32 -- it has the support salient 37 which inserts in a hole 33 and is directed on the wiring substrate 26 the front face by the side of the pressure-sensitive part material 32 of a periphery 36 -- right and left of the axis 38 of operating member 35 to drawing 3 -- **** or ** -- taking -- the axis 38 direction (the vertical direction of drawing 3) -- the support salient 37 to ****, or ** -- it is the press side 39 which inclined up like

[0080]

Between this press side 39 and the pressure-sensitive part material 32, the shock absorbing material 40 which has resiliency intervenes. Shock absorbing material 40 consists of electric insulation synthetic resin or synthetic rubber etc. which has resiliency and which has elasticity and tensile strengths, such as a styrene thermoplastic elastomer, for example. This shock absorbing material 40 is individually formed each class 27-30 on the pressure-sensitive part material 32, and in the natural state where the press force is not acting, it has the wedge-shaped cross-section configuration where thickness increases as it becomes a method of the outside of radial. That is, shock absorbing material 40 is right above [of each class 27-30], and is individually arranged a total of four pieces on the pressure-sensitive part material 32. this shock absorbing material 40 -- the center of the pressure-sensitive part material 32 -- in the natural state where the press force is not acting, it is formed so that the thickness may become large as it becomes a method of the outside of radial from a hole 33 By drawing 4 , in order to make an understanding easy, a slash is attached and shown in the pressure-sensitive part material 32 and shock absorbing material 40.

[0081]

An outward flange 41 is formed in the periphery 36 of operating member 35. the insertion to which this outward flange 41 was formed in the housing 22 of alter operation equipment 9 -- it is depressed in contact with the inside which is an inferior surface of tongue in drawing 3 of a hole 43 the control unit 44 of operating member 35 -- insertion -- from a hole 43, it exposes to a way outside housing 22, and projects partially above drawing 3

[0082]

Drawing 6 is the cross section which the 1st alter operation means 17 of other gestalten of operation of this design simplified. the operating member 35 which consists of a rigid electric insulation material -- for example, disc-like -- it is -- moreover, the pressure-sensitive part material 32 -- single -- it is disc-like [of one sheet], and other composition is the same as that of the gestalt of the operation explained in

relation to above-mentioned drawing 3 - drawing 5 , and gives the same reference mark to a corresponding portion With the gestalt of this operation, although the support salient 37 shown in above-mentioned drawing 3 is not formed, the electric resistance by the pressure-sensitive part material 32 of each class 27-30 corresponding to the position by which press operation is carried out changes to operating member 45.

[0083]

Drawing 7 is the electrodes 27a and 27b of each class 27-30 formed on the wiring substrate 26.;

They are 28a and the plan showing 28b;-. Electrodes 27a and 27b are formed in Kushigata, and are the same also about the other groups 28-30. Although it is prolonged in radial [of a closed loop 31] and Electrodes 27a and 27b may be arranged as shown in above-mentioned drawing 4 , as shown in drawing 7 , it is prolonged in the hoop direction of a closed loop 31, and they may be arranged at it.

[0084]

Drawing 8 is the electrical diagram showing the connection state of each class 27-30 of an electrode. The series circuit 52 electrode 27a of each class 27 and 28 arranged by the point symmetry, 27b;28a, and 28b mind the pressure-sensitive part material 32 by the line 51 is formed. As for the one side edge of this series circuit 52, voltage Vcc is given from the one side terminal of DC power supply, and an another side edge is grounded by common potential. Moreover, through the pressure-sensitive part material 32, voltage Vcc is connected by forming a series circuit 56 of a line 53, and connecting the one side edge to the one side terminal of DC power supply, and, as for an another side edge, the electrode of each class 29 and 30 arranged similarly at the point symmetry is also grounded at common potential. According to the press force, electric resistance changes and the pressure-sensitive part material 32 of these each class 27-30 is shown with the signs 47-50 of variable resistance at drawing 8 , respectively.

[0085]

In the 1st alter operation means 17, since all the directions of a press actuated valve position are expressed, a reference mark 47 works as a right key, and a reference mark 48 works as a left key, a reference mark 49 works as an upper key, and a reference mark 50 commits it as a lower key. The partial pressure voltage from lines 51 and 53 is drawn from output terminals 54 and 55, respectively. By forming the electrodes 27a and 27b of the couple of one group 27 in the common wiring substrate 26, composition is simplified and it is the same also about the other groups 28-30.

[0086]

Drawing 9 is the electrical diagram which ****(ed) a part of electrical circuit shown in drawing 8 relevant to the right key 47 and the left key 48. The partial pressure voltage V0 obtained from an output terminal 54 is shown by the formula 1, when setting the resistance of the right key 47 to R1 and setting the electric resistance of the left key 48 to R2.

[0087]

$$V0 = R2 \text{ and } Vcc / (R1 + R2) \text{ -- (1)}$$

if the control unit [axis / of operating member 35 / 38] 44 shifted is pressed -- a buffer -- a pressure joins the pressure-sensitive part material 32 through a member 40, and the electric resistance between electrode 27a in the pressure-sensitive part material 32 27, for example, one group, and 27b changes corresponding to the press force The partial pressure voltage V0 of an output terminal 54 changes with these according to the press force. The electric resistance value between electrode 27a obtained to the pressure of the pressure-sensitive part material 32 and 27b is 100ohms of numbers from several 10komega.

[0088]

For example, it is set to output voltage V0= abbreviation 0.003V, if the electric resistance between electrode 27a by the pressure-sensitive part material 32 and 27b is 30kohm, the left key. 48 of the group 28 which accomplishes a pair is pressed and the electric resistance between electrode 28a and 28b is 300ohms, when voltage Vcc=3V of DC power supply and the press force are zero. When each press force of the right key 47 and the left key 48 is zero, the voltage V0 of an output terminal 54 is set to 1.5V.

Therefore, it is the range of sufficient value to be able to use it with a small SN ratio in the processing means 16, without amplifying without setting the variation of voltage V0 to about 1.5 V, and such a value needing amplifier from the viewpoint of business.

[0089]

Drawing 10 is a graph which shows the property corresponding to the press force according the electric resistance between electrode 27a by the pressure-sensitive part material 32 in one group 27, and 27b of operating member 35. According to the lot at the time of manufacture of the pressure-sensitive part material 32, various kinds of properties of lines 57-59 are acquired. the range A1 below value P1 which the press force of the pressure-sensitive part material 32 defines beforehand according to these lines 57-59 -- the press force -- responding -- electric resistance -- a logarithm -- change of the electric resistance corresponding to change of a pressure at the range B1 which changes rapidly with a function [-like] and exceeds the press force P1 is loose

[0090]

Whenever it follows the view of this design, drawing 3 is caudad depressed for the outward flange 41 of operating member 35 explained in above-mentioned drawing 3 with housing 22, and the pressure P1 of drawing 10 defined beforehand will act beforehand, and will be made into a compression state at the pressure-sensitive part material 32. housing 22 -- the outward flange 41 of operating member 35, therefore a buffer -- the work which restricts the variation rate which resists the resiliency of the pressure-sensitive part material 32 so that the pressure-sensitive part material 32 may be made to compress beforehand through a member 40 -- carrying out -- therefore, the variation rate of the claim 11 of the above-mentioned [this housing 22] -- a limit means is committed Therefore, by carrying out press operation of the control unit 44 of operating member 35, the right key 47 from which the electric resistance between electrode 27a and 27b changes in the range B1 exceeding this pressure P1, therefore electric resistance changes gently corresponding to change of the press force will be attained. This is the same also about other each class 28-30.

[0091]

The pressure-sensitive part material 32 has a remarkable solid-state difference by production lot, as shown in the lines 57-59 of above-mentioned drawing 10 . with the gestalt of operation of this design, this pressure-sensitive part material 32 is not used independently, respectively every key 47-50 for each class 27-30, but common to these keys 47-50 -- single -- the pressure-sensitive part material 32 of one sheet is used The solid-state difference which originated in dispersion for every pressure-sensitive part material 32 in each position of each keys 47-50 by this will be generated at same rate. this solid-state difference is the same -- comparatively -- coming out -- being certain -- single -- by two arbitrary places of the pressure-sensitive part material 32 of one sheet, for example, one gestalt of this operation the group 27 symmetrical with a point, and 28; -- 29 and 30 -- therefore, each key 47 and 48; -- by using for 49 and 50 as partial pressure resistance As the electric resistance of two places which constitutes these series circuits will also change at same rate and is shown in the above-mentioned formula 1, the partial pressure voltage V0 outputted is not influenced of the solid-state difference of the pressure-sensitive part material 32. namely, -- even if the solid-state difference of the property of the pressure-sensitive part material 32 exists for every lot in a formula 1 -- the partial pressure voltage V0 -- the ratio of electric resistance -- since it is determined by $R2/(R1+R2)$, dispersion in the partial pressure voltage V0 by dispersion in the solid-state difference does not arise, and, moreover, the partial pressure voltage V0 does not vary corresponding to the value of a pressure

[0092]

In the 1st alter operation means 7, the right key 47 and the left key 48 corresponding to each class 27 and 28 arranged in the position of a point symmetry are not pressed simultaneously, and, similarly the upper key 49 and the lower key 50 are not pressed simultaneously. When it follows, for example, the upper key 49 is pressed, so to speak, the electric resistance of the electrode 30 by the pressure-sensitive part material 32 corresponding to the position of the lower key 50 is committed as a resistor of a dummy,

in order to obtain partial pressure voltage. Moreover, when the right key 47 is pressed similarly, the pressure-sensitive part material which acquires the electric resistance of the left key 48 works as a resistor of a dummy. In order to do in this way and to obtain the partial pressure voltage for every key 47-50 corresponding to each class 27-30 with the 1st alter operation means 17 It is not necessary to form the individual fixed resistance 123 shown in below-mentioned drawing 31 - drawing 33 . Moreover, there is an advantage that it becomes impossible for the group 126 of the electrodes 126a and 126b in drawing 34 - drawing 36 and the long and slender pressure-sensitive part material 32 to be required, they can make the pressure-sensitive part material 32 small, can do in this way, and can attain simplification of composition.

[0093]

The 2nd alter operation meanses 18 and 19 also have the same composition as each keys 47-50 of the 1st alter operation means 17, and are equipped with the composition of an independent key. With this composition, for example in the 2nd alter operation means 18, in order to form the electrodes 27a and 27b of the same couple as the above-mentioned group 27, to arrange the pressure-sensitive part material 32 over these electrodes 27a and 27b and to obtain the partial pressure voltage V0 further In order to obtain resistance of a dummy in series to these electrodes 27a and 27b, the electrode of the couple which has the same composition is prepared, it extends, and the same pressure-sensitive part material is arranged, or the fixed resistance of a dummy is connected again, and a series circuit is formed in this way. The 2nd alter operation meanses 18 and 19 are independent switches, and other composition is similar to the composition of the above-mentioned 1st alter operation means 17.

[0094]

the [the 1st described in relation to drawing 3 - drawing 10 , and] -- 2 alter operation meanses 17; -- while being simplified, being able to miniaturize 18 or 19 composition, and productivity's being excellent and being able to realize cheaply, dispersion in the property for every product is lost still as mentioned above, and, moreover, output partial pressure voltage is large to the grade which does not need amplifier

[0095]

The partial pressure voltage from output terminals 54 and 55 is changed into digital value in the analog-to-digital converter 23 in the processing means 16, and has the property of a line 61 shown in drawing 11 . the line 61 of this drawing 11 , and the lines 57-59 of above-mentioned drawing 10 -- the pressure-sensitive part material 32 -- the logarithm of the press force -- deriving the electric resistance which carried out change of-like is shown Variation delta R1, delta R2, and delta R3 of the electric resistance of the electrodes [in / one group 27 / for example] 27a and 27b when seting constant the variation delta P1, delta P2, and delta P3 of the press force in drawing 11 deltaR1>deltaR2>deltaR3 -- (2)

There is *****.

[0096]

The central-process circuit 24 carries out data processing of the line 61 of the digital value depending on the pressure-sensitive part material 32 of drawing 11 by which analog-to-digital conversion was carried out, and it changes so that it may become the line 62 which shows the property of digital value used as the primary value of a function of the press force. You may make it use the output of an analog-to-digital converter 23 as it is with other gestalten of operation of this design for other data processing. In order that the central-process circuit 24 may carry out data processing of the property shown with a line 62 from the property of a line 61 The store of the table showing the digital value of the line 62 corresponding to the digital value of the line 61 is beforehand carried out to the register of memory 63. The output of an analog-to-digital converter 23 is answered, and you may make it read the content of a store. with other gestalten of operation of this design It substitutes for the operation expression which defines beforehand the digital value shown with a line 61, and you may make it output the digital value which has the property shown with a line 62.

[0097]

Drawing 12 is a flow chart for explaining operation of the central-process circuit 24 in the processing

means 16. The central-process circuit 24 receives the synchronizing signal of a screen while receiving the indication signal which requires the data signal needed for data processing of a game through the flexible line 8 from serial input / output interface 65 from the microcomputer 15 of the main part 6 of a game machine. It moves from Step S1 to Step S2, and the content of a demand which the indication signal expresses is judged, for example, the character 12 in a game or a series of operation of a background 13, movement magnitude, the amount of acceleration, etc. are judged. step S3a-S3c -- the 1st - the 3rd alter operation means 17; 18, and 19; -- the 1st from 20 and 21 - the 3rd detecting signal are received, incorporation of data is performed, and data processing of the correlation which is those combination of the 1st - the 3rd detecting signal is carried out in step S4a-S4c The aforementioned range which belongs among two or more ranges of each which carry out level discrimination which performs a series of operation of a character 12 or a background 13 like below-mentioned drawing 13 - drawing 15 , and are beforehand defined by step S5a by this is judged. Moreover, similarly, the range by the level discrimination about a character 12 or the movement magnitude of a background 13 is judged, by step S5c, level discrimination about acceleration is carried out and the range is judged at step S5b further again. The incorporation of the data in the above-mentioned step S3a-3c is the 1st and 2nd detecting signals.

Although the digital value from the ** analog-to-digital converter 23 may be used as it is, as stated in relation to above-mentioned drawing 11 , you may be made to perform consecutive data processing to the primary value of a function corresponding to the press force using the digital value which carried out data processing.

[0098]

The digital value which carried out analog-to-digital conversion of the analog formula detecting signal obtained with alter operation equipment to the binary digit in the advanced technology Although data processing which changes into the information showing a series of operation of the character in for example, the amount of acceleration, movement magnitude, and a game etc. the digital value of the binary digit which gave the microcomputer of the main part of a game machine then, and was given from the alter operation equipment is performed and it can cook With the gestalt of operation of this design, from the microcomputer 15 of the game main part 6 The indication signal which it is required of the main part 6 of a game machine, i.e., expresses data processing which should be performed in alter operation equipment 9 Since it gives the processing means 16 of alter operation equipment 9 and the central-process circuit 24 of this processing means 16 generates the data signal corresponding to the content of this indication signal The burden of information processing of the microcomputer 15 of the main part 6 of a game machine in this design is mitigable, and the part and a microcomputer 15 can operate because of other data processing, and can aim at speedup of a game in this way.

[0099]

At Step S6 in drawing 12 , the data signal by which data processing was carried out corresponding to the range which is acquired by step S5 a-S5c, and by which a judgment was made [aforementioned] is the data stream which suited the communication format with the microcomputer 15 of the main part 6 of a game machine in the following step S6, and the store of it is carried out to an output register 64, and it is stored in it.

[0100]

In Step S7, if the indication signal showing the demand of a data signal is received from the microcomputer 15 of the main part 6 of a game machine, in the following step S8, the data signal will be drawn through the flexible line 8 by the main part 6 of a game machine. Next, reception of the signal with which the end of a game is expressed from the main part 6 of a game machine in step S9 ends a series of operation at Step S10.

[0101]

Drawing 13 is drawing for explaining the display mode of Screen 11 in the display means 10 by operation of alter operation equipment 9. Drawing 13 (1) is the plan of the 1st alter operation means 17. By

carrying out press operation of the right key 47, as shown in drawing 13 (2), on Screen 11, a character 12 moves in the move direction 164 of the method of the right. In the advanced technology, if it continues pressing the push-button to the right in alter operation equipment, the character 12 has composition which moves rightward [164] at a fixed speed in Screen 11.

[0102]

Operation relevant to one gestalt and the conventional technology of operation of such this design is further explained with reference to drawing 14. The state where press operation of the keys 47-50 in the 1st alter operation means 17 is not carried out is shown in drawing 14 (1), and the character 12 has stopped in Screen 11 at this time. ** [operation of the push-button to the right / move / continue / like drawing 14 (2) / through positions 67-69 / only the time corresponding to the time currently operated / a character 12 / at a fixed speed / from the first position 66 / with the advanced technology]

On the other hand, the digital value is the analog type 1st detecting signal corresponding to the resistance of the pressure-sensitive part material 32 by changing the 1st detecting signal of the 1st alter operation means 17 into digital value with the resolution of 7 bits in an analog-to-digital converter 23 with the gestalt of operation of this design like drawing 14 (1), drawing 14 (3) - drawing 14 (6).

It is alike, and it can respond and the digital value to 0-127 can be obtained. This digital value is divided into the 1st range which is 0, the 2nd range of 1-32, the 3rd range of 33-64, the 4th range of 65-96, and the 5th range of 97-127, level discrimination is carried out corresponding to the press force of the 1st alter operation means 17, the range is judged, and operation of drawing 14 (1), drawing 14 (3) - drawing 14 (6) is performed according to this. When the alter operation means 17 is not operated, it is in the state of drawing 14 (1).

[0103]

Drawing 15 is a wave form chart for explaining operation of the processing means 16 in alter operation equipment 9. The synchronizing signal shown in drawing 15 (1) through the flexible line 8 is given, and synchronizing with this synchronizing signal, the processing means 16 derives the data signal corresponding to the press force of the 1st alter operation means 17 from the main part 6 of a game machine, as shown in drawing 15 (2) - drawing 15 (6). Drawing 15 (2) shows the wave of the data signal in the state where press operation of the 1st alter operation means 17 is not carried out.

[0104]

When press operation of the 1st alter operation means 17 is carried out and the aforementioned digital value is in the 1st range of the above of 1-32, a data signal The frame number of plurality (the gestalt of this operation 4) of a screen defined beforehand is made into a unit like drawing 15 (3). It is one logical value, i.e., a low level, with 1 or two or more frames corresponding to the range by which a judgment of [of two or more of those frames] was made [aforementioned], and the high-level data signal which is the logical value of another side is serially derived with a residual frame (the zero of a frame are included). When this 1st range is judged, with the frame of a couple, it is a low level, and is high-level in three frames of the remainder. In one frame which is this low level, as shown in drawing 14 (3), only a fixed distance which corresponded to one frame from the original position 66 and which is defined beforehand moves a character 12. In this way, when the press force is the 1st range, for example, it is less than 1-100g, the traverse speed of a character 12 is a low. When it is 100g or more and less than 200g and the 2nd range of digital value is 33-64, as shown in drawing 15 (4), the 1st operation means 17 a data signal As it is a low level with two frames, a high-level signal is drawn with two residual frames and it is shown to drawing 14 (4) by this In the period of the frame which is a low level, a character 12 moves through a position 67, therefore traverse speed turns into a high speed compared with drawing 14 (3) and drawing 15 (3).

[0105]

The 1st alter operation means 17 if it is operated by the press force (300g or more and less than 400g), for example, the digital value corresponding to the press force A data signal is a low level with three frames, as shown in drawing 15 (5), at this time, it is the 3rd range of 65-96, it becomes high-level with one

residual frame, and as shown in drawing 14 (5), the original position 66 moves a character 12 through positions 67 and 68. Furthermore, if it is judged that it is operated by the large press force 400g or more, and the 5th range of digital value is 97-127, the 1st alter operation means 17 The data signal which is a low level is drawn over all four frames that are one unit as shown in drawing 15 (6). By this, for every frame, a character 12 moves through positions 67, 68, and 69 from the original position 66, as shown in drawing 14 (6), and it becomes high-speed.

It does in this way, and according to the press force of the 1st alter operation means 17, in the 2nd range - the 5th range, 1 time, 2 times, 3 times, and all frames will be covered at four frames, and the data signal from which a logical value changes [the data signal corresponding to the right key 47] with time progress serially will be drawn. This is the same also about other keys 48-50.

In this way, compared with the time of operating the digital formula push-button in conventional alter operation equipment, the press force is controlled by this design, as shown in drawing 14 (2), traverse speed of a character 12 can be made small and can be adjusted now, and the interest of a game can be increased.

[0106]

the [the 1st and] -- 2 alter operation meanses 17; -- after changing into digital value the 1st and 2nd detecting signals which have the level depending on the press force of 18 and 19 by the analog-to-digital converter 23, it is also possible to judge the digital value in the two ranges of binary [of ON/OFF], and to use it as a digital formula push-button by carrying out level discrimination with the value defined beforehand

[0107]

further -- the [the 1st and] -- 2 alter operation meanses 17; -- by operating 18 and 19, as shown in drawing 16 (1), it is also possible to move the character 12 in Screen 11, as the curved smooth tracing 71 is followed as show in drawing 16 (2) of an advanced technology, the character 12 in Screen 11 can only perform follow the tracing 72 on the curve which moved four directions and aslant [45] the combination of the tracing 72 on a curve, i.e., by carry out 2 press operations of the push-button the right, the left, above, and down individually or simultaneous, by operate the push-button of the digital formula which show a direction. This design solves this problem and it enables a character 12 to follow the smooth tracing 71 of above-mentioned drawing 16 (1).

[0108]

Drawing 17 is drawing for explaining operation for a character 12 following the smooth tracing 71 shown in drawing 16 (1). It is drawing 17 (1) about the 1st alter operation means 17.

When it is alike, and moving the position pushed smoothly as shown to a key 47 by the arrow mark 75 covering positions 73-74 from a key 49 so that it may be shown, the level of the detecting signal showing the electric resistance corresponding to the press force of each class 27-30 of an electrode changes. As shown in drawing 17 (2), according to composition of these vectors A2 and B-2, the slanting vector C2 can be acquired with the level of the detecting signal from each class 29 and 27 corresponding to rightward vector B-2 by the upward vector A2 by the key 49, and the key 47, respectively.

[0109]

$$A2+B-2 = C2 \text{ -- (3)}$$

Therefore, if press operation of the keys 49 and 47 is carried out simultaneously, tracing of a character 12 will become slanting corresponding to a vector C2. The inclination of this vector C2 changes with the vector ratios of the upward vector A2 and rightward vector B-2 in every direction.

Therefore, the inclination of the synthetic vector C2 can be smoothly expressed according to the press force of keys 49 and 47. Therefore, as shown in drawing 17 (3), the actual tracing 76 of a character 12 can be obtained almost in accordance with the tracing 77 of the request made into an ideal for every unit distance of division, such as every direction 12 or 128.

[0110]

On the other hand, in the advanced technology, since the digital formula push-button is used, the tracing

78 of an actual character shifts from the tracing 77 of the request made into an ideal greatly, and becomes the combination of each tracing 96 and 97 of above and the right, and the tracing 98 of 45 slant. In this way, about this design, a character 12 can follow the actual tracing 76 approximated very much on the tracing 77 of an ideal, and it can be moved now to it.

[0111]

Drawing 18 shows Screen 11 when performing a shooting game by the three-dimension-operation technique in other gestalten of operation of this design. A fighter 85 can move to top 81, bottom 82, the left 83, and the right 84, and it can be made to move the back and before Screen 11 further. the [for this reason,] -- 1 alter operation means 17 operates it -- having -- the further above-mentioned three-dimension-operation technique -- movement of the view of depth -- it can carry out -- further -- the [the 1st or] -- 2 alter operation means 17; -- the acceleration of a fighter 85 can be smoothly changed by the strength of the press force of 18 and 19

[0112]

Drawing 19 shows Screen 11 when performing a racing game using the three-dimension-operation technique in other gestalten of operation of this design. It can change smoothly, the end angle, i.e., the steering angle, of a handle of an automobile 86 which is a character, and the move direction 87 can be controlled by operation of the 1st alter operation means 17. Furthermore, the 2nd alter operation means 18 and 19 can be individually responded to an accelerator pedal and a brake pedal, and the acceleration of an automobile 86 can be moved according to an operator's natural feeling.

[0113]

Drawing 20 is drawing for explaining change of the display mode of the character 12 in the gestalt of further others of operation of this design. The data signal which moves the 2nd alter operation means 18 in the direction of Z-axis + with acceleration a by carrying out press operation in drawing 20 (1) shall be generated, and the data signal slowed down by braking operation shall be generated by operating the 3rd alter operation means 20. When the cube-like character 12 is moving in the direction of Z-axis + with acceleration a by press operation of the 2nd alter operation means 18, If it pushed further, with the press operation of the 2nd alter operation means 18 carried out as the 3rd alter operation means 20 of a digital formula was shown in drawing 20 (2), in the central-process circuit 24 the [these 2nd / the / and] -- the 2nd and 3rd detecting signals of 3 alter-operation means 18 and 20 will be answered, the correlation will be searched for, and the data signal from which the move direction of a character 12 turns into the direction of Z-axis - will be created

[0114]

Drawing 21 is drawing for explaining change of the display mode of the gestalt of further others of operation of this design. When games are fighting games, such as boxing, adjustment control of the angle covering all the directions of a character 88 can be carried out by operation of the 1st alter operation means 17, and the press force can adjust the traverse speed of a direction. Furthermore depending on the press force of the 2nd alter operation means 18 and 19, the strength of punch of a character 88 is adjusted. According to it, a character 89 responds to the strength of the punch. A part of character 89 For example, it becomes possible to be able to move, as the truncus is shown by the reference mark 90, to be able to express the strength of punch according to the movement magnitude, therefore to adjust the time rate of change of change of a character 89 by the press force of the 2nd alter operation means 18 and 19.

[0115]

Drawing 22 is drawing for explaining the change of the display mode of the screen [in / a fighting game / for example] 11 in the gestalt of further others of operation of this design. In the fighting game, a weak kick is performed like the leg 92 of the membrum inferius which is a part of character 91 which carried out human being's configuration. When a leg 93 carries out elevation displacement further, a degree is kicked in the middle, as shown by drawing 22 (2), a leg 94 carries out elevation displacement still like drawing 22 (3) and a strong kick is performed the [the 1st or] -- 2 alter operation means 17; -- the press force of 18 and 19 is changed and a strong kick is made to correspond to the large state from the

small state of the press force from a weak kick It can be made to be able to attack by the ability displaying the grade of the kick according to an operator's unconscious feeling, and can be made to correspond to an operator's intention by this.

[0116]

the [at the time of drawing 23 being the flow chart of other gestalten of operation of this design for explaining operation of the central-process circuit 24 in alter operation equipment 9, and operation of this drawing 23 being performed, as for drawing 24 / the 1st or] -- 2 alter operation meanses 17; -- it is the wave form chart of the 1st obtained from 18 and 19, or 2nd detecting signal The 1st or 2nd detecting signal shown in drawing 24 corresponds to the digital value which corresponded to the digital value changed by the analog-to-digital converter 23, or the digital value mentioned above in relation to drawing 11 and by which data processing was carried out. When the level of the 1st detecting signal changes like a line 101 when press operation is carried out so that it may strike, on the other hand press operation is slowly carried out, for example in the key 47 of the operating member 35 in the 1st alter operation means 17, the wave of a line 102 is acquired.

[0117]

In Step U1 of drawing 23 , the time of press operation being carried out so that the key 47 of the operating member 35 of the 1st alter operation means 17 may strike is assumed. the 1st whose central-process circuit 24 is the interrupt signal demand level to which the partial pressure voltage from an output terminal 54 was set beforehand at Step U2 -- it is the time t1 which became more than discrimination level V1, and interrupt operation is performed Step U3 -- this 1st detecting signal -- the 1st -- after becoming more than discrimination level V1, at Step U4, the partial pressure voltage V01 outputted to an output terminal 54 is incorporated waiting and after that to the time t2 in which the 1st defined beforehand carries out time W1 (for example, 1ms) progress At the following step U5, level discrimination of the partial pressure voltage V01 is carried out on the 2nd discrimination level Vt1, if the partial pressure voltage V01 is $V01 \geq Vt1$, in Step U6, it will be judged as that by which press operation was carried out so that operating member 35 may strike in a key 47, and the data signal for which the main part 6 of a game machine asks corresponding to the operation will be generated and derived by data processing. The 2nd discrimination level Vt1 is set to the value exceeding the 1st discrimination level V1.

[0118]

When press operation of the operating member 35 in the 1st alter operation means 17 is slowly carried out in a key 47, Steps U1-U5 of drawing 23 are performed almost similarly.

Level discrimination of the partial pressure voltage V02 in time t2a in which the 1st beforehand defined from time t1a of the 1st discrimination level V1 whose partial pressure voltage outputted from an output terminal 54 is interrupt signal demand level passed time W1 is carried out on the 2nd discrimination level Vt1. If it is judged at Step U5 that it is $V02 < Vt1$, it will move to Step U7. The data signal for which judges it as that by which press operation of the key 47 of operating member 35 was carried out slowly, and performs the usual analog processing, or the main part 6 of a game machine asks is generated and derived by data processing.

[0119]

Drawing 25 is the wave form chart of the 1st detecting signal which is the partial pressure voltage obtained from the output terminal 54 when separating a finger from the state which carried out press operation of the key 47 of the operating member 35 in the 1st alter operation means 17, for example. This partial pressure voltage corresponds to the signal after data processing which corresponded to the digital value obtained from an analog-to-digital converter 23, or was mentioned above in relation to drawing 11 . When the digiti manus is suddenly separated from the operating member 35 in a key 47 in instant, the wave of a line 103 is acquired, and when it detaches slowly to this, the wave of a line 104 is acquired.

[0120]

the 3rd which it moves from the central-process circuit 24 to Step U2 from Step U1 of drawing 23 , and is

the interrupt signal demand level of the central-process circuit 24 about partial pressure voltage when a line 103 is obtained -- the time t_3 which became less than [discrimination level V_2] is detected, and the partial-pressure voltage V_{04} of the output terminal 54 in the time t_4 in which the 2nd beforehand defined from the time t_3 carried out time W_2 (for example, 1ms) progress is incorporated at Step U Level discrimination of the partial pressure voltage V_{04} is carried out on the 4th discrimination level V_{t2} , and at Step U5, if it is $V_{04} \leq V_{t2}$, it is judged as that from which the digiti manus was suddenly separated by the key 47, and by Step U6, operating member 35 will carry out data processing of the data signal for which the main part 6 of a game machine asks by this, will generate it, and will derive it.

[0121]

When the digiti manus is slowly separated from operating member 35 so that a line 104 may be obtained, the partial pressure voltage V_{03} of time t_{4a} after the 2nd time W_2 progress defined beforehand is similarly obtained from time t_{3a} from which the partial pressure voltage became less than [interrupt signal demand level V_2] at Step U4. At Step U5, if it is judged that it is $V_{03} > V_{t2}$, it will be judged as that by which the digiti manus was slowly separated from operating member 35 in Step U7, and the data signal for which the usual analog processing or the main part of a game machine asks will be generated and derived by data processing. the 4th discrimination level V_{t2} -- the 3rd -- it is set to less than [discrimination level V_2] Although it gives above-mentioned explanation in relation to the key 47 of the 1st alter operation means 17, others reach key 48-50, and it is the same also about the 2nd alter operation meanses 18 and 19.

[0122]

Drawing 26 shows the data stream of the data signal drawn from the processing means 16 by the flexible line 8 in one gestalt of operation of this design relevant to above-mentioned drawing 23 and above-mentioned drawing 24. The partial pressure voltage in the 1st alter operation means 17 which reaches key 47-50 and is obtained by operation of the 2nd alter operation meanses 18 and 19 is more than interrupt signal demand level V_1 , and the data stream of drawing 26 (1) means whether press operation was carried out. These reach key 47-50, each bit position of a data stream corresponds to the 2nd alter operation meanses 18 and 19, and if press operation is carried out, logic "1" is generated, and logic "0" will be drawn if press operation is not carried out. In drawing 26 (1), the logical value by the 2nd alter operation meanses 18 and 19 is shown in the bit position of reference marks A and B, a still more nearly additional analog formula alter operation means is established, and bit-position C-L is prepared again corresponding to the 3rd alter operation meanses 20 and 21 etc.

[0123]

Following on the data stream of drawing 26 (1), the data signal which consists of another data stream further shown in drawing 26 (2) is drawn from the central-process circuit 24. the [whether in the data stream shown in this drawing 26 (2), the operating member / in / the 1st alter operation means 17 / especially / each bit position is the same as that of the bit position of the data stream of above-mentioned drawing 26 (1), and] 35 is the one or more 2nd discrimination level / in / drawing 24 / on each keys 47-50 and] V_t , and / -- according to whether it is less than one 2 discrimination level V_t , logic "1" and logic "0" are generated, respectively This is the same also about the 2nd alter operation meanses 18 and 19, and still the more nearly same also about other additional analog formula alter operation meanses. Therefore, it is used for data processing of the game in the main part 6 of a game machine by deriving the data signal which consists of each data stream of drawing 26 (1) and drawing 26 (2) from the processing means 16 for every frame on the main part 6 of a game machine synchronizing with a synchronizing signal. The data signal described in relation to drawing 25 further again is also given to the main part 6 of a game machine by the data stream shown in drawing 26, and the same data stream.

[0124]

Drawing 27 is drawing showing the state where data processing of a game is performed with a microcomputer 15 by the alter operation mentioned above in relation to drawing 23 in the main part 6 of a game machine - drawing 26, and it is displayed on Screen 11. Slowly so to speak, the key 47 of the

operating member 35 in the 1st alter operation means 17 is a weak touch like the line 102 of drawing 24 , therefore when press operation is carried out by the small time rate of change of the press force, by constant speed, it rolls rightward and a microcomputer 15 moves the character 12 of Screen 11, for example, as shown to the method of the right by the reference mark 105,106.

[0125]

As it is a strong touch so to speak, therefore it is shown to the line 101 of above-mentioned drawing 24 by big time rate of change, and it struck, when press operation of the key 47 of operating member 35 is carried out, as shown in drawing 27 (2), avoiding and jumping the obstruction 107 over the obstruction 107 in the screen 11, it rolls rightward and a character 12 is moved. the [thus, / the 1st and] -- 2 alter operation meanses 17; -- changing the press operating speed of 18 and 19 -- change of a character 12 or the display mode of a background -- varieties -- it can carry out

[0126]

Drawing 28 is the plan which the 1st alter operation means 17 of each of other gestalt of operation of this design simplified. The operating member 111 which replaces with the above-mentioned operating member 35 and 45, and is shown in drawing 28 (1) may be formed in the shape of a cross joint, and it may be formed in a square like the operating member 112 of drawing 28 (2), or may be formed in a right octagon like the operating member 113 of drawing 28 (3) again, and although such operating member 35 and 45,111,112,113 may be configurations symmetrical with a point, they may be other configurations.

[0127]

Drawing 29 is the plan showing each class 114-117 of the electrode of the 1st alter operation means 17 in other gestalten of operation of this design. Although each class 114-117 of an electrode is the same as that of the gestalt of the operation as which being opened, arranged and formed described the interval of 90 degrees to the hoop direction in relation to above-mentioned drawing 4 on the closed loop of a perfect circle Compared with the gestalt of operation of the drawing 4 , it has shifted to the hoop direction 45 degrees, two groups 114,115 are used for rightward detection, and the group 114,117 of an electrode is already for above detection. Such composition is also included in this design.

[0128]

Drawing 30 is drawing of longitudinal section which the 1st alter operation means 17 of the gestalt of further others of operation of this design simplified. The bowl-like operating member 118 is supported with two or more rollers 119, such as disc-like [which was prepared in the hoop direction centering on an axis 38], or a sphere. With an encoder, a detecting signal is drawn and the rotation and angle of rotation of a roller 119 can detect all the directions of the actuated valve position of operating member 118 in this way. The press force still more nearly parallel to the axis 38 of operating member 118 etc. is detectable with the press force detection means 120.

[0129]

With other gestalten of operation of this design, the composition which detects the press force by the support salient 37 of operating member 35 may be arranged on a substrate 26, and the composition may be the same as the pressure-sensitive part material 32 and the composition which uses Electrodes 27a and 27b.

[0130]

Drawing 31 is the cross section of the 2nd alter operation means 18, drawing 32 is the plan which the 2nd alter operation means 18 simplified, and drawing 33 is the electrical diagram showing the connection state of the 2nd alter operation means 18 shown in drawing 31 and drawing 32 . In these drawings, the same reference mark is given to the component to which the above-mentioned 1st alter operation means 17 corresponds. The pressure-sensitive part material 32 is arranged over an electrode 122a [of the couple of the group 122 formed on the wiring substrate 26], and 122b top, the rigid operating member 35 is arranged through shock absorbing material 40 on the pressure-sensitive part material 32, the outward flange 41 is pressed down with housing 22, and the pressure-sensitive part material 32 is in the state where it was compressed beforehand. it should observe -- with the gestalt of

implementation of this design, fixed resistance 123 is formed in the wiring substrate 26, this fixed resistance 123 is connected to electrode 122b through the line 124 formed on the wiring substrate 26, and a series circuit is formed. This series circuit is connected to the one side terminal Vcc of DC power supply in fixed resistance 123, and electrode 122a is grounded by common potential.

A line 124 is connected to an output terminal 125, and the 2nd detecting signal is drawn. The level of the 2nd detecting signal from this output terminal 125 is the partial pressure voltage by the electric resistance and fixed resistance 123 between electrode 122a of the couple depending on the press force of the pressure-sensitive part material 32 by operating member 35, and 122b.

[0131]

Drawing 34 is the cross section of the 2nd alter operation means 18 in other gestalten of operation of this design, drawing 35 is the plan which the 2nd alter operation means 18 shown in drawing 34 simplified, and drawing 36 is an electrical diagram explaining the connection state of the 2nd alter operation means 18 shown in drawing 34 and drawing 35. The gestalt of this operation is also similar to the composition of the 2nd alter operation means 18 shown in the above-mentioned 1st alter operation means 17 and above-mentioned drawing 31 - drawing 33, and gives the same reference mark to a corresponding portion. it should observe -- with the gestalt of this operation, the electrodes 126a and 126b of the couple of another group 126 other than a group 122 are formed in the wiring substrate 26, and the pressure-sensitive part material 32 is further arranged at it over each electrode 122a of these each class 122, 126, 122b; 126a, and 126b. Right above [of the aforementioned group 122], press operation of the pressure-sensitive part material 32 is carried out through shock absorbing material 40 from operating member 35. Electrode 122b and electrode 126a are connected through a line 127, a series circuit is constituted, electrode 126b in this series circuit is connected to one terminal Vcc of DC power supply, and electrode 122a is grounded by common potential. The partial pressure voltage from a line 127 is drawn from an output terminal 128 as the 2nd detecting signal.

[0132]

In order that the electric resistance of the pressure-sensitive part material 32 between electrode 126a and 126b may obtain partial pressure voltage from an output terminal 128, so to speak, the work as fixed resistance of a dummy is achieved. You may prepare the member for pressing the pressure-sensitive part material 32 in right above [of the aforementioned group 126] by the fixed pressure to those electrodes 126a and 126b. Other composition is the same as that of the gestalt of above-mentioned operation.

[0133]

With the gestalt of operation shown in drawing 34 - drawing 36, the pressure-sensitive part material 32 is formed in common over each class 122, 126. And since it has the composition that the partial pressure voltage by the electric resistance by the pressure-sensitive part material 32 in each class 122, 126 is drawn from the output terminal 128. The outstanding effect of preventing partial pressure voltage's changing a lot depending on the property of the pressure-sensitive part material 32, and dispersion arising the same with having mentioned above in relation to the 1st alter operation means 17 is attained.

[0134]

Another 2nd alter operation means 19 as well as the 2nd alter operation means 18 may be constituted. Each keys 47-50 of the 1st alter operation means 17 may also have the same composition as the above-mentioned 2nd alter operation means 18, respectively. Furthermore, the 3rd alter operation meanses 20 and 21 as well as the 2nd alter operation meanses 18 and 19 are constituted, and you may have detection equipment which makes binary digital value which carried out analog-to-digital conversion of the 2nd detecting signal, and obtained it on one discrimination level.

[0135]

*** NOTICES ***

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the plan simplifying and showing the composition of the one whole gestalt of operation of this design.

[Drawing 2] It is the block diagram simplifying and showing the composition of the home whole video game machine.

[Drawing 3] It is drawing of longitudinal section of the 1st alter operation means 17.

[Drawing 4] It is the plan which the 1st alter operation means 17 simplified.

[Drawing 5] It is the cross section seen from cutting plane line V-V of drawing 3.

[Drawing 6] It is the cross section which the 1st alter operation means 17 of other gestalten of operation of this design simplified.

[Drawing 7] They are electrode 27a of each class 27-30 formed on the wiring substrate 26, 27b;28a, and the plan showing 28b;--.

[Drawing 8] It is the electrical diagram showing the connection state of each class 27-30 of an electrode.

[Drawing 9] It is the electrical diagram which ****(ed) a part of electrical circuit shown in drawing 8 relevant to the right key 47 and the left key 48.

[Drawing 10] It is the graph which shows the property corresponding to the press force according the electric resistance between electrode 27a by the pressure-sensitive part material 32 in one group 27, and 27b to operating member 35.

[Drawing 11] It is a graph for changing into the line 62 which shows the property of digital value which serves as the primary value of a function of the press force in the property of the line 61 showing the digital value to which analog-to-digital conversion of the 1st detecting signal showing the electric resistance depending on the press force of the pressure-sensitive part material 32 was carried out, and explaining operation of an amendment sake.

[Drawing 12] It is a flow chart for explaining operation of the central-process circuit 24 in the processing means 16.

[Drawing 13] It is drawing for explaining the display mode of Screen 11 in the display means 10 by operation of alter operation equipment 9.

[Drawing 14] It is drawing for explaining movement to the right of the character 12 in Screen 11.

[Drawing 15] It is a wave form chart for explaining operation of the processing means 16 in alter operation equipment 9.

[Drawing 16] It is drawing for explaining operation to which tracing 71 and 72 is followed and the character 12 in Screen 11 is moved.

[Drawing 17] It is drawing for explaining operation for a character 12 following the smooth tracing 71 shown in drawing 16 (1).

[Drawing 18] Screen 11 when performing a shoe king game by the three-dimension-operation technique in other gestalten of operation of this design is shown.

[Drawing 19] Screen 11 when performing a racing game using the three-dimension-operation technique

in other gestalten of operation of this design is shown.

[Drawing 20] It is drawing for explaining change of the display mode of the character 12 in the gestalt of further others of operation of this design.

[Drawing 21] It is drawing for explaining change of the display mode of the gestalt of further others of operation of this design.

[Drawing 22] It is drawing for explaining the change of the display mode of the screen [in / a fighting game / for example] 11 in the gestalt of further others of operation of this design.

[Drawing 23] It is the flow chart of other gestalten of operation of this design for explaining operation of the central-process circuit 24 in alter operation equipment 9.

[Drawing 24] the [at the time of operation of drawing 23 being performed / the 1st or] -- 2 alter operation means 17; -- it is the wave form chart of the 1st obtained from 18 and 19, or 2nd detecting signal

[Drawing 25] It is the wave form chart of the 1st detecting signal which is the partial pressure voltage obtained from the output terminal 54 when separating a finger from the state which carried out press operation of the key 47 of the operating member 35 in the **** 1 alter-operation means 17.

[Drawing 26] The data stream of the data signal drawn from the processing means 16 by the flexible line 8 in one gestalt of operation of this design relevant to above-mentioned drawing 23 and above-mentioned drawing 24 is shown.

[Drawing 27] It is drawing showing the state where data processing of a game is performed with a microcomputer 15 by the alter operation mentioned above in relation to drawing 23 in the main part 6 of a game machine - drawing 26 , and it is displayed on Screen 11.

[Drawing 28] It is the plan which the 1st alter operation means 17 of each of other gestalt of operation of this design simplified.

[Drawing 29] It is the plan showing each class 114-117 of the electrode of the 1st alter operation means 17 in other gestalten of operation of this design.

[Drawing 30] It is drawing of longitudinal section which the 1st alter operation means 17 of the gestalt of further others of operation of this design simplified.

[Drawing 31] It is the cross section of the 2nd alter operation means 18.

[Drawing 32] It is the plan which the 2nd alter operation means 18 simplified.

[Drawing 33] It is the electrical diagram showing the connection state of the 2nd alter operation means 18 shown in drawing 31 and drawing 32 .

[Drawing 34] It is the cross section of the 2nd alter operation means 18 in other gestalten of operation of this design.

[Drawing 35] It is the plan which the 2nd alter operation means 18 shown in drawing 34 simplified.

[Drawing 36] It is an electrical diagram explaining the connection state of the 2nd alter operation means 18 shown in drawing 34 and drawing 35 .

[Drawing 37] It is the simplified cross section showing the push-buttons 1, 2, and 3 of the advanced technology.

[Description of Notations]

5 Television Set

6 Main Part of Game Machine

8 Flexible Line

9 Alter Operation Equipment

10 Display Means

11 Screen

12, 88, 89, 91 Character

13 Background

15 Microcomputer

16 Processing Means

17 1st Alter Operation Means
18 19 The 2nd alter operation means
20 21 The 3rd alter operation means
23 Daisy Dull / Analog Transducer
24 Central-Process Circuit
26 Wiring Substrate
27 to 30; 122,126 Group
27a, 27b;28a, 28b;122a, 122b;126a, a 126b electrode
31 Closed Loop
32 Pressure-sensitive Part Material
33 Hole
35 45,111,112,113,118 Operating member
36 Periphery
37 Support Salient
38 Axis
39 Press Side
40 Shock Absorbing Material
41 Flange
43 Insertion -- Hole
47, 48, 49, 50 Key
52 56 Series circuit
54 55 Output terminal